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DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with every copy of this week's issue

Change-over to Colour-Lights at Victoria

FROM Mr. E. J. Missenden, Traffic Manager of the Southern Railway, we have obtained some details of the change-over from semaphore to colour-light signalling at Victoria (Central Section) on Sunday last, June 4, and the speed and smoothness with which the change was made show that the Southern Railway has reduced even a job of this magnitude to the commonplace of a few hours' possession by the Signal & Telegraph Department. So confident was the company that the work would proceed according to plan that the whole of it was scheduled to be done in a normal interval of five hours between trains on Sunday morning; work began at 1.0 a.m., when four signal boxes operating 173 signals and 65 sets of points were thrown out of use, and by 5.45 a.m. one new signal box of the colour-light type had completely replaced them. The first in and out trains were signalled at 6.5 a.m. and 6.10 a.m. respectively, and these and subsequent trains were all handled without a moment's delay. The fact that not a hitch occurred reflects the greatest credit upon all concerned. Such a result requires careful thought and detailed organisation beforehand. There is much planning by the Signal Department and the Traffic Department—the signalmen were selected with great care and schools were set up for their training in colour-light signalling, so that they started off as "veterans" and are already quite at home with the new order of things. A noteworthy feature of the arrangements was that the interest of the public was secured by inviting season ticket holders to visit the new signal box before it was brought into use, and large numbers availed themselves of this opportunity.

* * * *

Moral Rearmament and the Oxford Group

In East Ham just a year ago Dr. Frank Buchman, leader of the Oxford Group, speaking on his 60th birthday, gave content to the term "Moral Rearmament." The world impact of that message cannot yet be adequately measured. The phrase has been on the lips of rulers, written in records of Parliaments, reached millions through press and radio, and is now a living philosophy for ordinary men and women in more than sixty countries throughout the world. An indication of its potentialities in the transport industry is given in the letter we received from a group of railway employees which appears on page 957. Elsewhere in this issue is a report of the meeting held in East Ham to mark the first anniversary of the launching of the M.R.A. campaign. With the passing of this first milestone the now famous statement of Lord Baldwin takes on a fresh significance—"The real need of the day is moral and spiritual rearmament. Were we, together with our fellowmen everywhere, to put the energy and resourcefulness into this task that we now find ourselves obliged to expend in national defence, the peace of the world would be assured." It is to be hoped that Moral Rearmament will prove a world force big enough—adequate enough—to secure world peace.

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The Week's Traffics

Figures of the four main-line companies for the past week include Whitsun Monday traffics and compare with those of the 22nd week in 1938 when the long-distance Whitsuntide holiday bookings sent up the passenger train takings. The first table compares the 22nd weeks in 1939 and 1938. In the two weeks covering the Whitsun holiday period in 1939 the improvement in comparison with the 1938 holiday was £30,000 in passengers, £279,000 in merchandise, and £94,000 in coal.

	22nd Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	− 71,000	+ 1,000	− 63,000	− 133,000	− 250,000	−0·95
L.N.E.R. ..	+ 7,000	+ 8,000	− 13,000	+ 2,000	− 308,000	−1·60
G.W.R. ..	− 27,000	− 14,000	− 19,000	− 60,000	+ 52,000	+0·48
S.R.	− 32,000	+ 2,000	—	− 30,000	+ 53,000	+0·63

In the following table the Whitsun Monday traffic week of 1939 is compared with an ordinary week in 1937:—

	22nd Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	+ 9[illegible],000	− 80,000	− 72,000	− 56,000	− 643,000	−2·42
L.N.E.R. ..	+ 66,000	− 31,000	− 54,000	− 19,000	− 524,000	−2·69
G.W.R. ..	+ 27,000	− 36,000	− 34,000	− 43,000	− 30,000	−0·27
S.R.	+ 21,000	− 2,000	− 2,000	+ 17,000	+ 9,000	+0·11

Earnings of the four companies to date in comparison with the first 22 weeks of 1937 show decreases of £222,000 on the passenger side and of £1,119,500 in merchandise, but an increase of £153,500 in coal.

* * * *

Two Months' Freight Traffics

Freight train traffic figures of British standard gauge railways for the eight weeks ended February 25, 1939, are grouped together in the Ministry of Transport statistics for February. They show decreases under all headings both in quantity and receipts, with the exception of live-stock which are up 2,183 or 1·28 per cent. in numbers and £3,173 or 2·02 per cent. in receipts. Of higher class

merchandise 7,019,034 tons were carried, a decrease of 469,735 tons or 6·27 per cent. Receipts therefrom were lower by £207,922 or 3·35 per cent., at £6,004,351. Minerals and merchandise in Classes 1 to 6 totalled 6,527,583 tons, showing a decrease of 2,458,216 tons or 27·36 per cent., with receipts of £1,755,045 which were lower by £585,843 or 25·03 per cent. Of coal, coke, and patent fuel 29,220,016 tons were carried, a figure lower by 769,505 tons or 2·57 per cent. than that for the corresponding period of 1938. A fall of only £11,689 or 0·19 per cent. was shown in the receipts from this traffic which amounted to £6,024,871. It is noticeable that the percentage drop in quantity is in each case larger than in receipts. The 5 per cent. increase in charges, it will be remembered, was in operation during both periods.

* * * *

British Guiana Transport

The Transport and Harbours Department of British Guiana controls railways, steamer services, the Bartika—Potaro—Issano road services, and harbour services. From the combined undertakings there was a net deficit of $63,375 in the year 1938 after providing for working expenses and interest and sinking fund charges, compared with one of $11,523 in 1937. Expenditure was higher because of better conditions of employment for the staff and increase in price of fuel and materials. Net receipts of the East Coast Railway of 60½ miles on the 4 ft. 8½ in. gauge were reduced from $36,972 to $12,453 and the deficit on working the West Coast Railway of 18½ miles on the 3 ft. 6 in. gauge was increased from $4,627 to $11,144. Railway figures are compared in the accompanying table:—

	1937	1938
Passengers	1,431,542	1,462,891
Tons	104,501	110,977
Train-miles	239,145	240,622
Operating ratio, per cent.	91·17	99·62
	$	$
Passenger receipts	155,449	157,042
Goods receipts	148,812	151,526
Gross receipts	354,940	352,864
Working expenditure	322,595	351,555
Net receipts	32,345	1,309

Road services showed a loss of $5,854 in 1938 due to heavy rains, and steamer services a loss of $8,002. From harbours there was a profit of $136,974. The British Guiana dollar = 4s. 2d.

* * * *

British Railways Plan More Cheap Excursions

During the next four months the four main-line railway companies will run more cheap day, half-day, and evening excursions than ever before. The endeavour will be made to provide facilities for as large a proportion of the population as possible for transport to the country and the seaside at low cost; the railways expect that the 17,500 half-day and evening trips planned between now and September will carry 8,000,000 passengers. Fifty per cent. of railway passenger journeys are made under excursion arrangements. Last summer, for example, 164,000,000 train journeys were made by those holding tickets at fares under 1d. a mile. Four hundred long-distance trains are being run to the Aldershot Tattoo—which began on June 7—and to the Navy Week displays at Chatham, Portsmouth, and Plymouth to be held later in the summer. Interavailability of tickets will be extended, a move which has been made possible by the co-ordination of road and railway services. One million passengers are now transferred every year from road to railway and *vice versa*. There is similar co-operation with steamer proprietors, so that combined rail, road, and steamer trips both for independent passengers and conducted parties are being extended.

* * * *

Keeping Up the Sales Effort

Mr. T. E. Argile, Acting Chief Commercial Manager, L.M.S.R., finds a little comfort and encouragement in recent traffic figures when writing in the July issue of *Quota News*. He points out that although this year has no special travel attraction such as the Empire Exhibition at Glasgow, the very uncertainty of international outlook that has been a damper on receipts may this summer help transport salesmen by influencing people to spend their holidays in Great Britain. He therefore recommends special attention on the one hand to the class of traveller who normally takes his holidays abroad, and on the other to the vast potential market of those who may be persuaded by cheap fares to use the railway for short-distance pleasure and shopping excursions. In this connection it will be recalled that a traffic survey quoted by Mr. Ashton Davies, Acting Vice-President, L.M.S.R., in his recent presidential address to the Railway Students' Association, showed that in 1933 no less than 73 per cent. of the passenger journeys on the L.M.S.R. (excluding season tickets) were for distances not exceeding 20 miles. *Quota News* helps the promotion of local pleasure traffic by publishing a monthly diary of events all over the system.

* * * *

Agreed Charges in Canada

The first "agreed charge" in Canada came into operation in May between the Canadian National and the Canadian Pacific Railways, as carriers, with a trader who is a large manufacturer of boxboard. It covers the carriage of "boxboard, carloads, from Montreal, Que., and Toronto, Ont., to Edmonton, Alta.," at a rate of $1·10 per 100 lb. in carloads of a minimum weight of 60,000 lb. The trader agrees "not to ship or permit or cause to be carried any part of the said traffic by any other means of transportation whatsoever." Upon default on the part of the trader, the railways will have the right to demand the regular tariff rates for all traffic handled and also to collect damages of 10 cents. per 100 lb. for all such freight shipped by any other means of transportation. They also have the right to inspect the trader's books to see whether the agreement is being complied with. It will be seen that this agreed charge differs in important respects from the agreed charges in Great Britain, where an agreed charge is usually a flat rate for any distance and does not always include all the traffic of a particular trader. A flat rate for any distance is not feasible in Canada where distances are so much greater. Our Railway Rates Tribunal allows an agreed charge only if it is satisfied that it will increase railway net revenue. In Canada the agreed charge is an experimental device to permit the railways, if possible, to hold traffic on the basis of their average superiority over competing forms of transportation.

* * * *

A Leak in the Vacuum Brake Equipment

Colonel A. C. Trench's report on the accident at Aberdeen Joint station on October 7, 1938, when an engine collided with its train when backing on is summarised on page 956. The report shows the cause to have been failure of the vacuum brake equipment, combined with neglect of the driver, who had realised that the brake was not acting when pulling up at a signal on his run from the sheds, to proceed with the care necessary in such serious circumstances. The driver is held respon-

sible for the accident and criticised for proceeding to his train, knowing of the defect and intending to make his journey relying on the equipment on the coaches. One brake cylinder was found to be leaky, rendering the others inoperative through the pipe connecting the engine and tender cylinders and the vacuum reservoir. Other mechanical defects were found, one or two contributory to the origin of the leak, and some not easy to explain. Colonel Trench recommends that when a defect in the vacuum system is suspected it should be expressly noted when calling for the attention of shed staff, who may otherwise merely make mechanical adjustments, as did in fact happen with this engine a few days before. He also suggests steps for limiting the effects of a leak.

* * * *

The Clyde Coast Traffic

The Operating Department, Northern Division, L.M.S.R., has for many years employed specialised operating methods for working the intensive main service between Glasgow and the Clyde Coast resorts. Some details thereof are revealed in the June issue of "On Time," the organ of the L.M.S.R. Operating Department. The services concerned are centred on both the St. Enoch (former G.S.W.R.) and the Central (former Caledonian) termini in Glasgow; they are, as a rule, worked by Class "4" standard 2-6-4 tanks, which have now ousted the native product. Sunday traffic has grown enormously; the seven Sunday trains on the Gourock and Wemyss Bay routes a few years ago have swelled to 51 today. On Scottish holidays, especially Glasgow Spring (Easter) and Glasgow Fair, numerous extra trains are needed to augment the ordinary service. At such times the size of the homeward-bound throng may necessitate trains following one another at five minute intervals in the evening on the Port-Glasgow—Glasgow (Central) section which is common to both Gourock and Wemyss Bay trains. In the summer, excursions are run to the Clyde Coast, not only from the principal Scottish towns but also from many English places. Most of the Clyde Coast lines run close to the river and are, consequently, easily graded, but the Wemyss Bay and Greenock (Prince's Pier) branches are exceptions; they include long stretches at 1 in 70 and 1 in 80. Locomotive work is, however, good. The 9.14 a.m. residential express from Prince's Pier to St. Enoch has, for instance, to cover the very steep, gable-shaped, course between Prince's Pier and Cart Junction (Elderslie) at an average speed of nearly 40 m.p.h.

* * * *

Streamline Reliability

A striking testimony to the quality of present-day locomotive design, building, and maintenance is afforded by the recent performance of one of the L.N.E.R. "A4" Pacifics, No. 4497, *Golden Plover*, which has worked for eight weeks continuously on the Coronation streamliner, not missing a single journey. This has involved 39 consecutive trips, five days in each week on the Coronation express, and a sixth day on an ordinary express, making a total mileage, including running to and from shed, of 2,373 each week, of which 1,964 miles weekly have been covered at the high scheduled speeds of this streamline service. In the eight weeks, therefore, the engine has run 15,315 miles on Coronation schedules, including 4,705 miles in all at the 71·9-m.p.h. average of the down Coronation from King's Cross to York—the fastest schedule in the British Empire. Furthermore, so well to time was the express on the down journey that out of the 25 down runs, 21 were on or before time at Newcastle; on 15 occasions Newcastle was reached at 7.54 p.m., 3 min. early, and once at 7.52 p.m., 5 min. early. Actually the feat of making 39 consecutive Coronation journeys does not constitute a record, for in 1937 engine No. 4491, *Commonwealth of Australia*, made 40 consecutive runs with this express. Not only do these performances speak highly for the condition of locomotives able to perform such onerous tasks day after day without casualty, but they also help to demonstrate that scheduled average speeds of 68 to 72 m.p.h., and sustained maxima of 90 m.p.h., as demanded of these L.N.E.R. streamliners, are a thoroughly practical operating proposition.

* * * *

Large Locomotive Tenders

Mr. A. A. Raymond, Superintendent of Fuel and Locomotive Performance, New York Central Railway, referred in a paper that he read before the Western Railway Club, Chicago, to the question of large locomotive tenders, dealing with the subject from the point of relative economy. He said that the question that must arise is the expense of hauling the added weight over the railway, and for the purpose of illustration he took a run of 930 miles using approximately 54 tons of coal. The point to be settled is whether it is better to use a comparatively light tender carrying 15,000 gal. of water and 30 tons of coal, or a heavier tender with the same water capacity but capable of taking 60 tons of coal. The two stops necessary for refuelling the smaller tender used within 560 lb. of the amount of coal necessary to haul the larger tender, this of course being based on operating one locomotive throughout. If it were not possible to make a stop for coal on account of a tight schedule and another locomotive had to be used, the expense would be much higher because of the amount of coal used before the locomotive could be turned on to another train, and in addition there would be the lost service of the locomotive for an appreciable length of time. In view of these facts Mr. Raymond held that the larger tender was justified, but an alternative was to build a small but adequate coaling plant where it was necessary to stop trains for changes of crew or other purpose of the same nature. New locomotives, he said, should be equipped with large tenders.

* * * *

The Decline of the Trunk

Though we may sometimes look back at the Victorian Age with feelings of nostalgia, we can hardly regret in our retrospective musings the passing of one prominent feature of those days—the Victorian holiday and all its appurtenances. Its symbol, the trunk, an expression of the idea of the solidarity and solidity of the times, has been replaced, as a survey of any station at this season will show, by the upstart suitcase and rucksack. The year 1918 marked the beginning of its end; the coming-in of the week and long week-end holiday has hastened its decline. We wear lighter—and less—clothing than we used to, and the ubiquitous chain store at our chosen resort can be relied on for those things we forgot or didn't want to pack. Perhaps, too, the war may have helped in the movement towards trunkless travel. It taught us to be dextrous in packing necessities into a small space, a trick about which the Roman soldiers knew a thing or two. We call to mind in this connection the drawings of Cæsar's legions with their odd-looking packs—*sarcinæ*—that enlivened the pages of our much-thumbed *De Bello Gallico*, but we cannot call to mind any references to the luggage that the Roman patrician took with him on holiday. Did he call them and think of them as his *impedimenta*, or had he such an expressive term as the American—"*grips*"? Surely the Greeks would have had such a word for them.

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Annual Review of Railway Charges

THE Railway Rates Tribunal has announced its intention of reviewing the standard charges and exceptional charges of the four main-line railway companies on June 14. This, the eleventh review conducted by that body since standard charges were introduced on January 1, 1928, will be of unusual significance on this occasion, as when the promised legislation implementing the recommendations of the Transport Advisory Council is passed, the standard charges and the standard revenue provisions of the Railways Act, 1921 will be repealed. Consequently the forthcoming review will probably be the last to be held. The duty devolves upon the Tribunal under Section 59 (1) of the Act, which directs it to review the charges at the end of each financial year unless the Minister of Transport decides that the review need not be held. The Minister has not exercised his power to cancel the review for the year 1938, and the Tribunal has therefore followed its usual custom of requiring the railway companies to furnish detailed operating and financial statements to facilitate the proceedings at the public inquiry. At the hearing the Tribunal has to comply with Section 59 (3) of the Act, which requires it to compare the net revenue of each of the companies for the year 1938, or the average annual net revenues of the companies for the last three years, with the standard revenues and any allowances granted by the Tribunal in respect of additional capital raised or provided in respect of expenditure on capital account since January 1, 1928.

The standard revenues of the four group companies, including the allowances authorised in respect of additional capital between January 1, 1928, and December 31, 1937, amounted to £51,359,095 but, as the net revenues of the companies for the year 1938 totalled only £28,984,344, they were no less than £22,374,751 short of the standard, a decrease of £8,918,003 compared with 1937. If the average of the net revenues for the last three years be taken, there is a deficiency of £17,153,344, so that by either method of calculation there is a large deficiency. The Tribunal is therefore required by the Act to consider whether the deficiency arose through lack of efficiency or economy in the management of the undertakings. Evidence will be led by the companies on this point which should satisfy the Tribunal. Their statements will indicate that during the year the railway gross receipts decreased by £7,015,786, while the railway working expenditure rose by £1,651,721. The serious drop in revenue was due to the carryings of iron ore being nearly 3 million tons down, and of manufactured and semi-manufactured iron and steel over 5½ million tons less than in 1937. Decreases totalling 21 millions were also recorded in the tonnages of the principal classes of merchandise and minerals; coal, coke, and patent fuel were down by 18 million tons. The rise in expenditure was due entirely to increased wage costs and rises in the price of materials.

Should the Tribunal be satisfied that there was no lack of efficiency and economy in management, it will have to determine whether the deficiency between the net and standard revenues of the companies is likely to continue. This question should easily be determined as, although railway receipts have been rising during the last few weeks, they are still £453,000 less than in the corresponding period of last year. It is therefore clear that, even should the upward trend continue unchecked, there is no possibility of the companies achieving their standard revenues this year. Moreover, the legislation required to implement the Transport Advisory Council's report on the companies' application for relief from certain statutory obligations in connection with the quotation of rates for the conveyance of merchandise is unlikely to become effective in time for it to have any material effect on the companies' receipts this year. As in former years, the companies have been invited to express their views as to the modifications which the Tribunal is required to make in the standard charges for the purpose of enabling them to earn during 1939 their standard revenues, plus the allowances in respect of additional capital. On this point they have intimated that they are unable to say that an increase of charges on certain traffics would not yield additional revenue, but it is not their intention to put forward any proposals for a modification of the existing charges at the present time.

* * * *

Antofagasta (Chili) & Bolivia Railway

THE owned and operated lines of this company, which has two separate administrations, one at Antofagasta covering the lines in Chile, and one at La Paz dealing with the Bolivian lines, also provide connections with Argentina and Peru. The railways throughout are of metre gauge. A system of waterworks is also part of the company's undertaking. Among the railways operated are the Aguas Blancas, the Chilian Northern Longitudinal, and the Bolivia, but the receipts and expenses of these lines are not included in the company's revenue account. As shown by the report for the year 1938, gross receipts of the whole undertaking amounted to £750,874, a decrease of £133,279 or 15·07 per cent., and in the working expenses of £558,834 the reduction was only £11,862 or 2·08 per cent., so that the net receipts of £192,040 were lower by £121,417 or 38·73 per cent. As in the previous year the sum of £100,000 was received by way of dividend from the Andes Trust, Limited, and the net income of £16,656 from the Bolivia Railway bonds was £8,871 higher. Debenture interest was fully covered, and the amount to be provided in connection with the lease of the Aguas Blancas Railway was raised from £46,068 to £60,008. The working of that railway resulted in a loss of £1,069, against a profit of £1,047 in 1937. On the 5 per cent., cumulative preference stock a dividend of 1½ per cent. was paid on December 14, 1938, on account of the year 1935. The accompanying table compares the financial position of the past two years:—

	1937	1938
	£	£
Railway gross receipts	849,318	715,123
Railway working expenses	547,323	523,583
Railway net receipts	301,990	191,540
Total income	589,545	487,661
Debenture interest, rentals, &c.	276,515	290,456
Exchange	53,000	38,425
Preference dividend arrears	125,000	30,000
Carried forward	135,030	128,780

Compared with 1937, there was a reduction in the total tonnage of goods traffic handled. Increases in certain classes for the Bolivian section were more than offset by reductions on the Chilean section. The quantity of nitrate carried was 184,306 tons, a decrease of 13,845 tons or 6·99 per cent., and in copper bars the tonnage was 148,857, against 178,602, a decrease of 16·65 per cent. On the other hand high-grade tin barrilla shipped to the company's ports totalled 39,563 tons in 1938 against 32,463 tons in 1937. Most items of up traffic showed decreases, although there was some improvement in consignments to Bolivia, notably in general merchandise, coal, and fuel oil. First class passenger traffic was well maintained but there was an appreciable decrease in second class passengers in both Bolivia and Chile. In Bolivia a scale of surcharges on tariffs was authorised as from July 15 last, but the additional revenue therefrom only partly compensated for the depreciation in the sterling equivalent of the Bolivian dollar. Railway working expenses were reduced by £23,740, but the operating ratio rose from 64·44 per cent.

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to 73·22 per cent. The decrease in expenditure was due mainly to the smaller volume of traffic handled, exemption from Bolivian customs duties on coal and fuel oil, and to smaller contributions to renewals. The reduction in expenditure would have been appreciably greater but for increases in currency salaries and wages and additional contributions payable under the social laws. Capital expenditure during 1938 amounted to £45,127, including the conversion of 100 flat wagons to open goods wagons.

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100 m.p.h. with Steam

RECENT developments in high-speed rail transport make it clear that in the realm of long-distance continuous high-speed running the protagonists of propulsion by steam are by no means disposed, even in the United States, where so much has been done to develop diesel propulsion, to leave the field to the diesel engine. A striking development, for example, on the lines of the Chicago & North Western and Union Pacific companies, over which there run the well-known diesel streamline trains City of Denver, City of Los Angeles, and City of San Francisco, with formations of from twelve to seventeen cars, is that the City of Denver is, owing to its popularity, being duplicated daily, and that the second portion, running in times closely approaching those of the diesel train, is to be operated by steam power. Deducting 30 min. spent at stops, this means that " 2nd No. 111 "—the steam train concerned —will cover 1,045 miles in about 16¼ hr., at an average of over 64 m.p.h. throughout. A similar decision has been reached by the Chicago, Burlington & Quincy Railroad, which plans to double its Denver Zephyr with a steam-hauled second section, conveying, like the " 2nd No. 111 " of the rival route, sleeping and reclining chair equipment, with dining and observation cars.

What such schedules as these entail in the realm of maximum speeds with steam power is best realised by a study of the article on the Hiawatha streamliner of the Milwaukee RR., which appears on page 957 of this issue. This, by now the best-established of all the American ultra high-speed services worked by steam, has a schedule which practically demands speeds of 100 m.p.h., as a daily proposition, for its maintenance, and both the original streamlined Atlantics built for the service, as well as their later 4-6-4 development, find no difficulty in reaching three-figure speeds on level track. In the westbound direction the Hiawatha is actually booked in the working timetables over the 57·6 miles from signal tower A.20, outside Chicago, to Lake, in the suburbs of Milwaukee, in 38 min., at a pass-to-pass average of 90·9 m.p.h., and in the reverse direction in 40 min., at 86·4 m.p.h.; and among the start-to-stop bookings further west is one over the 78·3 miles from Sparta to Portage in 63 min., at 74·6 m.p.h., over a section with some 1 in 200 and 1 in 150 grades, and several fairly severe service slacks. The run last-mentioned is made by the eastbound morning Hiawatha, which is booked to cover 250 miles of its daily journey (the total of the fastest sections) at an average of 77·4 m.p.h. Yet a run is quoted in the article on page 937 in which it was found practicable, with one of the Atlantics and a 465-ton train, to recover 35 min. lost by signal and permanent way checks and overtime at stations, and to complete the 411½ miles from Chicago to St. Paul at an average of 72·0 m.p.h. throughout, so effecting a punctual arrival.

It is also noteworthy that the accelerations which have gradually cut the 20-hr. schedule of the New York Central's Twentieth Century Limited down to 16 hr. for the 958 miles from New York to Chicago are still maintained by steam; and this, with due allowance for the slow travelling necessary through the vicinity of the great cities passed through *en route*, makes running speeds of 75 to 80 m.p.h. necessary, with trains of considerable weight, over long distances. The competing Pennsylvania Broadway Limited, with its shorter but much more heavily-graded route, requires to run at equally high speeds west of Crestline, and these are still being maintained by the " K4s " class Pacifics—a type which first went into service 25 years ago. It is over the same route that the non-streamlined Detroit Arrow makes its 73·6-m.p.h. average in both directions between Fort Wayne and Englewood, 141·0 miles apart, and this is but one of several runs scheduled over this section at more than 70 m.p.h. When it comes to maximum speeds, again, it is doubtful whether diesel transport can show anything substantially higher than has been achieved with steam. One of the latest 4-6-4 steam locomotives of the Milwaukee, on ordinary service with the Hiawatha between Chicago and Milwaukee, has maintained an average speed of 100 m.p.h. for 19 miles continuously, and of 120 m.p.h. for five miles; and the L.N.E.R. record of five miles at 120 m.p.h., with a momentary maximum of 126 m.p.h., reached on the Coronation brake trials of July, 1938, is still fresh in mind. On a number of occasions, indeed, steam locomotives have been responsible for speeds of over 110 m.p.h., and those who pin their faith to the continued possibilities of steam may well take heart from these achievements.

* * * *

Spanish Railway Legislation

THAT the Burgos Government is losing no time in tackling the economic problems which must now be of pressing interest in Spain, is shown by the new railway law, the text of which was outlined in a news article last week. The new law, which is to operate until a definite statute is promulgated, is drastic in its brevity. For each of the principal systems, the Northern, the M.Z.A., and the Andaluces-Western, it appoints a directing council of eight members, six (including the Manager) nominated by the Ministers of Public Works, Commerce, Finance and Defence, and two by the respective company. The present boards of directors are " dissolved." Then, in addition to the directing councils, a central railway Junta, or board, is to be constituted, formed of the managers and representatives of the State on the councils, with in addition, the railway *comisarios*, the Chief of Road Transport, and the Director of the Transport Syndicate. The mission of this central Junta is to prepare the definite statute and meanwhile to control the finance and development of the railways, including road transport co-ordination. Detailed rules for the operation of the Law are to be dictated by the Minister of Public Works. There is no mention of the smaller companies in the decree, but it seems to be assumed that the definite statute will apply to the whole of the railway system. In this new Law there is no reference whatever to the rights of the companies under their concessions, or to the rights of the bondholders. The only representation the companies are to have is that of two members with a sort of watching brief, on the directing council, but not on the central board, and even these two members are to be chosen by the Government from among six persons nominated by the company. It will be seen that the control of the railways is taken from the companies and there is no attempt to link up the new law with the existing legislation, either under the law of 1877 or the Statute of 1924. Unless this has been deferred for consideration in the " definite statute " which is promised, the new measure will savour strongly of nationalisation, and nationalisation without compensation.

The last attempt to place railway transport in Spain

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on a sound basis was in 1924, when the Government of General Primo de Rivera introduced a statute providing for advances of capital by the State under a sort of co-partnership with the companies, with an adjustment of tariffs to cover the interest on the joint capital. The railways were certainly enabled, with the new money, to improve and extend their service (the electrification of some of the Northern lines is an example), but unfortunately the extraordinary impulse given to motor transport by the improvements in roads carried out during the same period ended by diverting from the railways the traffic which would have justified (and paid for) the improvements, and tariff revision was again indefinitely postponed. From 1931 onwards the railway industry suffered perhaps more than any other from the effects of the oppressive social legislation of Popular Front Governments, culminating in the civil war, when the systems of the Northern and M.Z.A. were divided between the two forces. The sections of both railways between Madrid and Catalonia, and in the South, were first seized by the Workers' Councils and later nationalised by the Republican Government, while the lines in Nationalist territory continued working but with their traffic increased under the special wartime conditions. The war ended, the companies, great and small, whose lines were in Republican territory, looked forward to the restoration of their properties and the resumption of normal working. Now it appears that in the case of the big companies these expectations are not to be realised and the future is even more uncertain, unless it be that in the definite statute, for which the decree of May 8 is said to be a preparatory measure, there is to be some consideration for the rights of the companies and their stockholders. No doubt timely representations will be made to Señor Alfonso Peña, the Minister of Public Works, and General Franco's other advisers, in that sense.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Moral Re-armament and the Transport Industry

London, June 5

To the Editor of The Railway Gazette

Sir,—We read with great interest and appreciation your editorial note and report headed "Moral Re-armament" in the issue of The Railway Gazette dated May 12. We refer to the account of a meeting of over one hundred editors and representatives of trade journals at the Holborn Restaurant, to hear from business men in the Oxford Group how Moral Re-Armament is at work in Great Britain and other countries, bringing a new spirit of confidence in business. We believe that the transport industry, to which we are proud to belong, has an important part to play in this programme of constructive action. Recent events have made people realise that transport is the "lifeblood of the nation" and the planning and the action of our great transport undertakings have shown that they are ready to play their part in any national emergency.

We see, however, that there is another aspect of National Service which is even more important. This has been expressed in the call for Moral Re-Armament made on all sides by national leaders of every class; a call for a new spirit in the home, in business, and in national life. The undersigned have pledged themselves to promote this spirit in every possible way, and we have evidence of how it is already working in the transport industry. It is showing how absolute honesty in negotiations between employers and employed clears away suspicion and promotes trust. Only in this atmosphere can a permanent settlement, acceptable to all parties, be found. As more of us learn to apply the simple truths of honesty and unselfishness in our daily job, confidence will be restored, the brakes will be released, and we can move right ahead to a new era of understanding and goodwill.

We are certain that many of our colleagues all over the country will be keen to join us in our determination to bring about the new spirit of confidence which we all need, as our contribution to National Service.

Yours faithfully,

HARTLEY GRUNWELL
S. R. DAVIES
J. HARRISON
J. R. PIKE
W. E. C. LAZENBY
C. MAXWELL TREGURTHA
F. A. DENBY
HELEN CATTO
H. DICKINSON
W. E. COBB
ERNEST MOSBY
FLORENCE M. SMITH

The First Passenger Train

Swansea, June 2

To the Editor of The Railway Gazette

Sir,—By a coincidence, I was with Mr. E. A. Watkins, the Secretary of the Swansea & Mumbles Railway (the owning company, not the lessee), on the day that the June 2 issue of The Railway Gazette was published, containing the letter from "Praxiteles" asking when this railway was opened. Mr. Watkins has in his possession certain of the old account and minute books of the original Oystermouth Railway or Tramroad Company relating to the first decade of the nineteenth century, and we examined these together. They do not appear to reveal when goods traffic first passed over the line, for it was worked as a toll road and the first cash receipts book has not survived; it seems, however, that a limited traffic over part of the railway began as early as April, 1806.

Nevertheless, our examination of these documents did reveal the very interesting and important date when passenger traffic first began. This was March 25, 1807; the earliest-known date of the regular conveyance of passengers by rail. The vehicle was provided by a Mr. Benjamin French, who offered to pay the company £20 per annum in lieu of tolls, a proposal which was accepted by the "meeting of the committee of the company of proprietors" (otherwise, the board of directors), at its meeting on February 16, 1807. A year later, Mr. French joined with two others in offering £25 per annum from Lady Day, 1808, so it appears that the passenger traffic paid.

Yours faithfully,

CHARLES E. LEE

More Free Advice

Garlands, Harrow
June 2, 1939

To the Editor of The Railway Gazette

Sir,—I would like to draw attention to the fact that if all the trains in this country were equipped with steel coaches, the death rate due to railway crashes would be lessened by over 50 per cent. Take for instance the crash on the L.N.E.R. at Hilgay on the first of this month. The three women who were killed would more than likely have escaped with bruises and shock. I would also like to mention that I think there should be some means by which the guard can communicate with the driver from his van, instead of having to wait till he gets to a station. I suggest a short wave transmitter be fitted in the guard's van, with an aerial on the driver's cab, connected to a loudspeaker. Lastly I would like to say that in my opinion all cross-gates on main lines running through the country should be abolished, and railway policemen stationed in their place.

Yours faithfully,

JOHN SCHRODER

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THE SCRAP HEAP

Commemorating the tour of the King and Queen in Canada, a special menu card has been placed in all dining cars and hotels of the Canadian National Railways. Artistically designed, it depicts a class "6400" Canadian National locomotive in royal blue and silver and bearing the Royal Coat-of-Arms in natural colours, hauling the royal train, with a scenic background typical of some of the areas through which it is passing.

* * *

During their tour across Canada from east to west the King and Queen rode for thirteen miles in the Rockies on the footplate of the leading locomotive of the three that were hauling the royal train at that point. With Their Majesties was Mr. W. M. Neal, Vice-President, Western Lines, Canadian Pacific Railway; the driver was a compatriot of the Queen's and had worked on the Caledonian Railway. The King showed himself to be well acquainted with locomotive working and was very interested in the automatic stoker.

* * *

Over two million pigeons will be conveyed by the L.M.S.R. in 2,000 special vans during the 1939 racing season. A 71-page booklet which includes the activities of over 100 racing clubs, federations and combines situated chiefly in Lancashire, the Midlands, Derbyshire, the West and North of England, and Scotland, has been produced for the guidance of the railway staff, who undertake to release the birds for the homeward flight.

* * *

In 1938 no fewer than 15 American business men received salaries of over £9,000. Among them were Mr. Martin Clement, President of the Pennsylvania Railroad, with £21,000, and Mr. George Houston, President, Baldwin Locomotive Works, with £18,000, whose salaries added together, however, fell short by £5,000 of that received by the highest-paid American business man, Mr. Walter S. Gifford, President, American Telephone & Telegraph Company.

* * *

The following curious paragraph appeared in the *Huntingdon Gazette* of January 1, 1825:—

"A meeting of Sweepers was held on Friday evening at the sign of the Bone and Scrape in Cross Street which was numerously attended. It was agreed that a handsome silver pickaxe be presented to Macadam with the following inscription engraved on it:—"To Mr. Macadam Esquire, In Gratitude for the important services which he has rendered the Worshipful Company of Sweepers by giving permanent employment to hundreds who, were it not for his wonderful improvements, would be obliged to toil for their bread like vulgar mechanics or industrious tradesfolk.'"

* * *

MILLIONS OF SLEEPERS

Assuming the entire railroad system of the United States to be 160,000 miles, as appears from "Poor's Manual," with the addition of the lines in construction during the current year, and taking 2,640 ties per mile of track, we have in use at least 422,400,000 ties. This estimate, large though the total appears, is under the mark, as no railroad uses less than 2,640 ties per mile, and many of the roads with heavy traffic have 2,816, and in a few cases more.—*From the "Scientific American" of June*, 1889.

* * *

The town of Clare, in the south-west corner of Suffolk, on the River Stour, possessed during the time of the Saxon heptarchy a fine castle, built as a fortification on the border line of Suffolk and Essex. Today the L.N.E.R. station at Clare stands on the site of the castle, and, in constructing the approach to the railway premises in 1866 it was necessary to cut through a huge earth rampart. This work resulted in the finding of a golden crucifix, which until 1937 was kept at Windsor Castle, when it was deposited in the British Museum. During recent diggings in the railway station yard some well-preserved human skulls and bones were found, and also the top jaw bone of a wild boar.

* * *

From time to time in the four Melbourne daily newspapers the Victorian Railways Publicity Department inserts advertisements stressing the cheap, safe, and dependable service which the railway administration gives to the inhabitants of this flourishing Australian State. One of these advertisements was reproduced in our issue of March 17. Others which have appeared inform Victorians about the sweeping reductions in railway fares, the travel saving card scheme, the quick goods transport services, and the ease with which the administration can carry out mass transportation of passengers and merchandise.

* * *

CAUTIONARY TALES FOR RAILWAY PASSENGERS

Tale of Henry Arthur Thompson-Gurney

(*Who was too inquisitive*)

When Henry Arthur Thompson-Gurney
Was taken on a railway journey,
He trotted up and down the train,
Which made the passengers complain.
But more than that, the little man
Counted each package in the van;
And ere the train was passing Tring
Investigated everything
Except—
a most enormous crate
Which stood in solitary state
Safely behind the other stuff.
Of this, he couldn't know enough.
He picked its padlocks, one—two—three—
And slowly raised the lid, to see
Within the confines of the case
A tiger stare him in the face!
The train ran on to Liverpool
(Where Henry Arthur went to school)
Ere Father said: "I greatly fear
We must have lost the little dear!"
They searched the platforms, searched the train—
But he was never seen again.
The moral is, that little lads,
In trains, should stay beside their dads.

C. HAMILTON ELLIS

"Double fare if you catch it up!"

[*Reproduced by permission of the proprietors of "Punch"*]

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OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

ARGENTINA

Accelerated Running of El Rápido

The timing of the Central Argentine Buenos Aires-Rosario express El Rápido has been still further reduced from 4 hr. to 3 hr. 45 min. for the run of 188 miles in each direction, thus enabling the return journey between the two cities to be made comfortably and expeditiously in the day. The train, which is equipped with Pullman and dining cars, leaves Rosario at 9.15 a.m., arriving at Buenos Aires at 1 p.m. On the return journey the hour of departure from Buenos Aires is 7.00 p.m., arriving at Rosario at 10.45 p.m.

State Railways Combined International Service

On April 1, the State Railways inaugurated an international service from Buenos Aires to La Paz, Bolivia, with connections for Chile and Peru. The train leaves the Córdoba Central terminus at Buenos Aires every Wednesday at 8.50 a.m., Rosario at 3.20 p.m., Santa Fé (C.N.A.) at 7.55 p.m., and Tucumán at 1.35 p.m. on Thursday, arriving at La Paz on Saturday at 4.30 p.m. The return journey is made on Fridays, leaving La Paz at 2.00 p.m. and arriving at Buenos Aires on Monday at 8.00 p.m.

Maize Harvest Prospects : First Official Estimate

The first official estimate of this year's maize harvest, issued on April 14, puts the probable production at 5,400,000 tons. Although this figure is 976,000 tons higher than last year's crop, which was one of the lowest on record, it is, nevertheless, nearly 3,000,000 tons below the average for the last five years, owing to the drought in many districts.

CHILE

German Equipment for State Railways

According to a telegraphic report from Berlin, transmitted through the Havas agency, locomotives and other equipment to the value of ten million marks will be acquired in Germany by the Chilean State Railways. It is also stated that a Chilean railway commission is at present in Germany arranging for the purchase of the material in question, the first consignment of which will be despatched at an early date.

UNITED STATES

New Union Station at Los Angeles

The new union passenger terminal at Los Angeles, built jointly by the Southern Pacific, the Atchison, Topeka and Santa Fe, and the Union Pacific Railroads, was opened on May 7. It has cost over $11,000,000 and is the finest station on the Pacific coast. It is a terminus and has 12 platform roads with low-level platforms between each pair; rail level is 17 ft. above station floor—and presumably approach road—level. There is a six-line approach and the layout includes 62 turnouts, mostly having solid manganese, self-guarded crossing frogs; also 26 double slips and one movable diamond crossing. The station buildings are a medley of irregular structures having a main frontage 860 ft. in length.

CEYLON

Nuwera Eliya Line to be Closed

In accordance with the recommendations of the recent Retrenchment Commission, the Government Railway administration has decided to close the Uda—Pussellawa narrow gauge hill line at an early date. The line leaves the main line at Nanu Oya and serves Nuwera Eliya, one of the most beautiful and best-known hill stations in the East; it is 19 miles in length. Its closure depends upon satisfactory arrangements being made with passenger and goods road undertakings to act as feeders to the railway at Nanu Oya, as the retention of the Nuwera Eliya and tea traffic over the comparatively long lead between Nanu Oya and Colombo by rail is important.

The Nanu Oya—Nuwera Eliya section was opened for passenger traffic on December 14, 1903, and the further section from Nuwera Eliya to Ragalla on July 25 of the next year. The line serves a prosperous tea-planting area as well as Nuwera Eliya, but in recent years road competition has caused it to be worked at a loss.

The locomotives and rolling stock available due to the closure may be used on the Kelani Valley line of the same gauge; but that, too, may be closed, in which case a market might be found for the stock of both lines in India.

The formation and bridges of the U.-P. line are to be adapted for widening the road, which for the greater part of its length runs side by side with the railway.

EIRE

Timetable Alterations, G.S.R.

The new engines now being built at Inchicore for the Great Southern Railways, one of which is already on trial, will permit of the following accelerations when the summer service is introduced. The 7.0 a.m. Cork mail train from Dublin will leave at 7.15 a.m. and arrive at Cork at 10.48 a.m. instead of 10.55 a.m., so that there will be a saving of approximately 22 min. on the run. This train has to await the arrival at Kingsbridge of a train from Dun Laoghaire pier which leaves the latter on arrival of the mailboat from Holyhead. The later departure from Kingsbridge will give an additional margin which should tend to more punctual working, as there are a number of causes, such as fog and bad weather, affecting the punctual arrival of the incoming boat at the pier head. The 3.50 p.m. mail train from Cork to Kingsbridge will leave 15 min. later, and arrive at Kingsbridge at the same time as at present. These trains are run under contract with the Post Office, and the number of stops is regulated by the requirements stipulated in the contract.

The connecting trains both on the outward and the return journey will also be altered, and as most of them run on single lines, the difficulty of arranging crossings with other trains can only be overcome by further minor alterations. Consequential alterations as well are necessary on minor branches. With these exceptions the proposed summer timetable will be similar to that in operation last year.

Should it eventually prove feasible to run these mail trains to and from Dun Laoghaire pier, a further saving in time will be effected, as at present the train from the pier to Kingsbridge has to reverse outside the station before reaching the platform, and the transfer of passengers, luggage and mails adds to the time taken on the journey. Similar delays occur in the opposite direction.

HOLLAND

Operating Features

The coming into force of the summer timetable, reported in the issue of May 19, entails one or two features of special operating interest. The introduction of a half-hourly service on the electrified lines in the central area, bears out experience elsewhere, namely, that real economies in electric services are possible only when it is feasible to run trains—usually of proportionately shorter units—at intervals of 30 min. or less. The rigid timetables introduced a year ago on all lines have proved satisfactory on the whole, but one feature, the unavoidably poor connections at certain junctions—especially at the apex of a triangle the junctions at the base of which have been provided with good connections between trains—has given rise to complaints. These have now been met, at least in the central area, by the introduction of the half-hourly service, and corresponding reduction of waits for connections.

Sections Closed

On the date of the introduction of the summer timetables two more sections, together aggregating 40 miles in length, were closed to passenger traffic, namely, Assen to Stadskanaal, and Stadskanaal to Zuidbroek junction. A few other sections are scheduled for similar closing at an early date, their timetables being published " until

further notice." In mileage of closed lines, and the number of closed stations no parallel can be found now in any other country.

International and Suburban Services Lag Behind

Concentration on efforts to improve the inter-urban services, has undoubtedly met with a considerable amount of success, but international and suburban services still take a bad second place. As it appears to be impossible to work steam-operated trains at a start-to-stop speed higher than about 60 m.p.h., the international expresses are given paths in the timetable well in front of the electric fast trains on the outward journey, and following the electric trains on the inward trip, which results in longer waits at the frontier stations. Also the management has not yet seen its way to abolish the supplementary charge on these so-called "D" trains for the short section within Dutch territory, a charge unpopular with travellers from Belgium, France, and farther afield, where supplementary charges are not levied on the same trains. Suburban services are still lagging behind in the general improvements. In speed, frequency, and in rolling stock equipment there remains room for a larger measure of efficiency and economies.

Ticket Examination

A novel feature, introduced on the first day of the new summer timetable, is a modified system of ticket inspection. Hitherto ticket inspection and collection took place at the platform entrance, on the train, and at the station exit. It was apparent that at least one of these inspections could be reduced or abolished; curiously enough the choice fell on the one at the platform entrance, although the closed station is the rule in Holland. Some difficulties are experienced at the exits by visitors who have entered the station unchecked without platform tickets. A small reduction in staff has been possible at those stations where there are separate entrances and exits, though supervision at the entrance still remains essential to prevent passengers leaving the station that way, and to direct passengers to their trains.

This measure has been introduced with the ultimate intention of adopting the American system of open stations and ticket inspection and collection on the train, but before this can be done it will be necessary to convert all coaches into corridor stock.

ITALY

Future Rome Underground Railway

In outlining before Parliament future railway developments, the Minister of Communications said that the Rome underground line, to be inaugurated in 1942, would be 11 km. in length and be designed for a service taking 13 min. for this distance, inclusive of four intermediate stops. It would have a carrying capacity of 34,000 passengers an hour in each direction, and a two-minute train service.

Dealing with the financial side of the Italian railway problem, the Minister pointed out that during the first half of the fiscal year 1938-1939 there had been a decline of 158 million lire in the State Railways' receipts from the goods traffic, but since there had been an increase of 48 million lire in passenger receipts, the total decline in receipts had not exceeded 110 million lire. Up to the end of April, 1939, he concluded, thanks to a slight revival of the goods traffic, there had been a decline of only 36 million lire in the receipts for both passengers and freight, so it was hoped that the final financial results would remain similar to those during 1937-1938.

SWITZERLAND

Railway Exhibits at the National Exhibition

The opening of the Swiss National Exhibition at Zurich took place on May 6 with appropriate festivities, and the number of entries recorded during the first few days shows the great interest aroused throughout the country in this event. [A map showing the position of the exhibition grounds and their relation to the lines and stations in Zurich appeared on p. 1,040 of our issue for December 16, 1938—ED. *R.G.*] The Transport Section has a separate building for railway exhibits, outside which are two standard-gauge tracks and one of metre-gauge, accommodating some remarkable new types of Swiss rolling-stock. Between the two standard-gauge tracks—which have direct connection with Zurich-Wollishofen station—is a covered platform, equipped with the Gfeller system of light signals for brake tests and departure indications which may be worked by the public. The following rolling-stock is shown, fitted with steps and gangways to allow inspection by visitors:—

(1) New twin-unit lightweight high-speed electric set of the Red Arrow type, specially designed for excursion traffic and equipped with a bar and kitchen for serving light refreshments.

(2) Twin-unit lightweight electric Blue Arrow set of the Loetschberg Railway, which has been in service for a year and covered approximately 80,000 km.

(3) New double electric 12,000-h.p. electric locomotive for the Gotthard route of the Federal Railways (described in *Electric Railway Traction Supplement* for February 3, 1939).

(4) New diesel-electric locomotive, with Sulzer engine, for the Federal Railways, intended for service on the Schaffausen-Konstanz line.

(5) New 38-*tonne* mail and parcels van, arranged to give an accurate idea of actual service conditions.

(6) New 1-Co Co-1 6,000-h.p. electric locomotive for the Loetschberg Railway, as described in the January 6 issue of the *Electric Railway Traction Supplement*.

On the narrow-gauge track are shown a saloon observation car, with glass sides and roof, for the Brünig line of the Federal Railways; and a steam rotary snow-plough shown jointly by the Rhaetian and Bernina Railways. Nearby are two short sections of track on which may be seen the oldest existing Swiss locomotive, the *Speiser* of the former Centralbahn, built in 1857 by Emil Kessler, of Esslingen, and rebuilt at the Olten works in 1886; and engine No. 1, with vertical boiler, of the Rigi (rack) Railway, the first mountain railway in the world.

[Some of these exhibits are illustrated on page 949.—ED. *R.G.*]

Models, Maps and Diagrams

The exhibits in the building consist mainly of models, illuminated maps, and diagrams. Several good reproductions of steam and electric locomotives are the work of members of the principal Swiss model railway clubs. Of the other and larger models, one of the most interesting is a lightweight electric motor coach and trailer of the type which will be placed in service on the Rhaetian Railway later in the year. In the main hall, a model of part of the city of Berne shows the four-track deviation between Berne and Wilerfeld, at present under construction, with the new Aare bridge and approach viaduct, of which separate diagrams and sections are also shown. There is a model of the Weiermannshaus goods station at Berne, and some interesting working models.

A novel and ingenious stand, the mechanism of which was devised and built in the Zurich workshops of the Federal Railways, has a number of parallel tracks on which models of steam and electric passenger and goods trains and a Red Arrow railcar advance, both on the level and on a heavy gradient, at speeds proportionately corresponding to the actual maximum speeds of such trains. Several large illuminated maps show, respectively, the Swiss railway system, principal international connections, and places covered by the railways' door-to-door goods service. A popular exhibit is a model of the high-speed streamlined train invented by Prof. Wiesinger, of the Federal Technical High School.

SPAIN

Ministries Return to Madrid

Preparations are gradually being made for the re-establishment of the administrative services of the Government in Madrid, and their removal from the crowded and unsuitable quarters they have occupied during the war in Burgos and other provincial cities. Two of the sections of the Ministry of Public Works have recently been trans-

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ferred to Madrid from Santander, namely, the Railway Section and the Department of Hydraulic Works. Other branches of the Ministry are to follow, but it is expected that the Minister himself and his staff may continue in Santander for the present.

The Sud Express

As a result of the meeting of representatives of the French, Spanish, and Portuguese railways on May 24, it is expected that the through service of the Sud Express between Paris and Lisbon, interrupted by the civil war in Spain, will be resumed on June 10.

Rolling Stock Returned

Rolling stock, consisting of some 470 carriages and wagons has been handed over to General Franco's Government by the French authorities. This completes the delivery of rolling stock provided for under the agreement between the Spanish Foreign Minister, General Jordana, and the French envoy, M. Berard.

Locomotive Construction and Repair

The *Official Bulletin* published in Burgos on May 12 contains two Decrees relating to locomotives. The first, dated May 8, authorises the three principal companies to place contracts with national manufacturers for all the general repairs to locomotives which they are unable to undertake in their own workshops, the expenses incurred being defrayed by the State for account of the companies. A second Decree of the same date authorises the Minister of Public Works to contract, also with the national industries, for the construction of 750 locomotives for the broad gauge railways, on the basis of the prices in force in 1935. Construction is to be spread over a period of five years, but the first 150 units are to be ready within 20 months. Both these orders refer to the Decree of March 12, 1938, which was described in THE RAILWAY GAZETTE of May 13, of that year (page 922).

NORWAY

"Flashtrips" Railcar Service

To meet the wishes of those tourists who prefer travelling in a railcar to a train, the Berg-Hansen and Winge travel bureaux have co-operated, with the approval of the management of the State Railways, to form a company known as The Flashtrips, with the idea of running a railcar service thrice weekly on the Bergen Railway. The new company has obtained on loan from the Michelin Company, of Clermont-Ferrand, France, a new pneumatic-tyred railcar seating 76 passengers and weighing some 340 lb. a passenger, as against the 2,000 lb. of the State Railways bogie stock. The car is capable of attaining 50 m.p.h. in a distance from rest of 823 yd., and of pulling up from that speed within 92 yd.

London Passenger Fares—Figures Presented at Rates Tribunal Hearing of Application by Main-Line Companies and London Transport for increase in London Area

(*See article opposite*)

	1933/1934 £38,771,139			1933/1934 (*adjusted*) £38,771,139			1934/1935 £39,796,187			1934/1935 (*adjusted*) £39,796,187		
	Main-line companies £	Board £	Total £	Main-line companies £	Board £	Total £	Main-line companies £	Board £	Total £	Main-line companies £	Board £	Total £
Gross receipts												
Distribution :—												
Operating allowances ..	4,156,884	18,419,614	22,576,498	3,930,279	18,121,682	22,051,961	4,015,932	18,218,885	22,234,817	3,968,452	18,064,217	22,032,669
Additional allowances ..	—	—	—	—	—	—	17,712	5,571	23,283	17,712	5,571	23,283
Share of net pool ..	6,153,199	10,041,442	16,194,641	6,352,499	10,366,679	16,719,178	6,646,297	10,891,790	17,538,087	6,722,903	11,017,332	17,740,235
Total receipts after pooling	10,310,083	28,461,056	38,771,139	10,282,778	28,488,361	38,771,139	10,679,941	29,116,246	39,796,187	10,709,067	29,087,120	39,796,187

	1935/1936 £40,606,339			1936/1937 £41,377,929			1937/1938 £42,120,179			1938/1939 (estimated) £42,351,000		
	Main-line companies £	Board £	Total £	Main-line companies £	Board £	Total £	Main-line companies £	Board £	Total £	Main-line companies £	Board £	Total £
Gross receipts												
Distribution :—												
Operating allowances ..	4,074,841	18,692,070	22,766,911	4,282,298	19,238,536	23,520,834	4,324,961	19,886,987	24,211,948	4,455,000	20,222,000	24,677,000
Additional allowances ..	42,977	26,675	69,652	67,664	47,051	114,715	115,948	138,399	254,347	180,000	272,000	452,000
Share of net pool ..	6,734,098	11,035,678	17,769,776	6,723,715	11,018,665	17,742,380	6,690,179	10,963,705	17,653,884	6,526,000	10,696,000	17,222,000
Total receipts after pooling	10,851,916	29,754,423	40,606,339	11,073,677	30,304,252	41,377,929	11,131,088	30,989,091	42,120,179	11,161,000	31,190,000	42,351,000

Table I.—POOL RESULTS FOR FIVE YEARS ENDED JUNE 30, 1938, AND ESTIMATED POOL RESULTS FOR YEAR ENDED JUNE 30, 1939

(Figures in respect of joint lines allocated in ownership proportions)

LONDON PASSENGER FARES

Receipts accruing to railway systems from the London Passenger Transport Pool, quoted by Sir William Wood in evidence at Rates Tribunal hearing of application for fare increases

DURING the recent hearing by the Railway Rates Tribunal of the applications by the main-line railway companies and the London Passenger Transport Board for authority to increase passenger fares in the London area, some very interesting statistics were produced by Sir William V. Wood, Vice-President of the L.M.S.R., showing the financial result to the individual companies and the board of the pooling arrangement which has been operative since the board began operations. By his courtesy we are able to reproduce two of the tables, referred to in his evidence as "W.V.W.3," which he used for explaining to the tribunal his evidence on the matter and which were not published in the printed proceedings. In studying these figures it is necessary to have in mind what may be termed the structure of the pool, as well as the financial results which it yields to the interested parties.

The pooling arrangement, unlike most other pools, was not arranged voluntarily by its constituent members, but in pursuance of the provisions of the London Passenger Transport Act, 1933. Section 31 (1) of that Act directs that, with a view to securing that the services provided or to be provided by the board shall be properly co-ordinated with the suburban passenger services of the four amalgamated companies, there shall be established a Standing Joint Committee representative of each of the parties. Section 31 places a variety of duties upon this committee, including the obligation of preparing a scheme, framed in accordance with the Tenth Schedule to the Act, for the pooling of the whole of the passenger receipts to which the scheme is to apply; and Section 31 (6) requires that the scheme, when agreed, should be submitted for confirmation to the Arbitration Tribunal set up under Section 12 of the Act. The scheme was duly prepared by the committee and, after making three minor amendments, the tribunal approved it on June 18, 1935, for operation as from July 1, 1933, the date on which the operations of the board began.

It should be noted that paragraph 2 of the approved pooling scheme defines "suburban lines" as meaning so much of any railway owned or worked over by any of the amalgamated railway companies or of any joint line as (*a*) lies within the L.P.T.B. area, or (*b*) outside that area and provides an alternative route on which a passenger service provided by the board (otherwise than under a working agreement made in pursuance of Section 18 of the 1933 Act) is being or might lawfully be operated. Thus the pooling scheme applies not only to the London Transport area, but to certain stations immediately outside the board's boundary which are listed in an appendix.

Paragraph 4 of the scheme provides that it shall apply to the whole of the passenger receipts of (*a*) the board, including passenger receipts accruing to the board arising from any joint line or joint operation and receipts from the operation of contract carriages; and (*b*) each of the amalgamated companies attributable to the conveyance of passengers on journeys between any two stations on any suburban line or lines. Further paragraphs of the scheme make it clear, however, that the receipts to be pooled are not the gross originating receipts of the parties, but the gross originating receipts less agreed deductions in respect of operating allowances and additional allowances as defined below. So far as operating allowances are concerned, the scheme provides for them to be fixed by the Standing Joint Committee from time to time, based on a formula compiled to give effect to those factors of cost which vary with the mileage of trains or cars or other vehicles run. These are set out in Appendix D:—

L.P.T.B.—Electric current for running, lighting and heating passenger-carrying vehicles:
Petrol and other fuel.
Wages and clothing of trainmen or drivers and conductors.
Maintenance and renewal of rolling stock (excluding superintendence).
Tyres for passenger road service vehicles,
Cleaning, lubricating and inspecting vehicles and supplies for vehicles.
Depot overhead expenses (engineering).
Licensed vehicle duty and licence fees.
Main-line companies.—Fuel for steam trains.
Electric current for running, lighting and heating electric trains.
Lubricants, water and other stores (including clothing) for the running of locomotives and electric motors.
Wages connected with running locomotives and electric motors.
Guards' wages and clothing.
Maintenance and renewal of rolling stock (excluding superintendence).
Cleaning, lubricating and lighting of vehicles.
Lighting, cleaning and maintenance of running shed equipment.

These items of cost are calculated in the case of the railways on a train-mile basis for steam trains, and a car-mile basis for electric trains, while in the case of road vehicles they are calculated on a vehicle-mile. The actual operating allowance is obtained by multiplying the agreed rates per mile by the pool mileage. It will be seen that these allowances exclude anything in respect of the maintenance of the permanent way, signals, stations, &c., the expenditure on which does not necessarily vary with the quantum of the traffic, and they do not cover the station staff costs and remuneration of capital.

With regard to additional allowances, the scheme provides that where any party to the pool provides any new service or facility, or undertakes any new development necessitating additional capital expenditure, the party concerned shall be entitled to an additional allowance of such amount and for such a period as the Standing Joint Committee may determine. The allowance is required to be estimated at such a level as will, when it is added to the operating allowances, cover the additional cost of operation, maintenance and renewal involved in the provision of the service, facility or development, as well as the whole or part of the interest on the capital as may be determined by the committee. This provision is of considerable importance seeing that since 1933 substantial capital expenditure has been or will be incurred, including the current programme of new works estimated to cost something like £45,000,000.

The basis used for the division of the pool was the results of the year 1932. The whole of the traffics to be brought within the pool were ascertained for that year and the operating allowances which would have been payable if the pool had been in existence were determined for that year. The results for the year 1932 were ascertained with considerable care and were then adjusted in respect of any capital expenditure which had not become fully remunerative as at July 1, 1933, and of any further factor which had not been fully reflected at that date in the results.

Provision is made in the pooling scheme for the revision

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of the standard proportions in certain eventualities, and in fact they were modified slightly in 1934/5. The standard proportions as then fixed and now operative are as under:—

	Per cent.	
London Passenger Transport Board ..	62·10364	
Great Western Railway	1·33194	37·89636
London Midland & Scottish Railway ..	5·08014	
London & North Eastern Railway ..	5·99922	
Southern Railway	25·48506	
	100·00000	

An important feature of the foregoing arrangement is that, subject to the adjustment and payment of monthly differences between the pooled receipts and the share of the aggregate pooled receipts to which each party is entitled, each member retains all its passenger receipts in respect of traffic arising within the area and the ordinary methods of dividing the receipts through the Railway Clearing House or by means of private settlements no longer obtain. For this reason the division of the pooled receipts between the companies is not a reliable indication of the distribution of the traffic between them since 1933. As the pool is of originating receipts only, less the above-mentioned allowances, it will be appreciated that it is not a pool of gross receipts or net receipts, but something between the two.

Pool Financial Results

Table I shows the results of the pooling scheme for the five years ended June 30, 1938, and the estimated results for the year ending June 30, 1939, after the figures in respect of joint lines have been allocated in their ownership proportions. It will be seen that the figures for 1933-4 and 1934-5 are shown twice, the second set of each figures being termed "adjusted." This is due to the fact that the operating allowances recovered by the parties in 1933/4 were based on the costs of the year 1932 and those recovered in the year 1934/5 were based on the costs of the year 1933/4. For statistical and comparative purposes only it was subsequently felt desirable to show the position of the pool for the years 1933/4 and 1934/5 as it would have been if the operating allowances for those years had been based on the actual costs incurred by the parties in those two years. Operating allowances are at present calculated on the actual costs of each pool year. The adjusted figures are, however, calculations only, as the actual divisions previously made were not disturbed. Since 1934/5 the current figures have been used and no further adjustments are necessary.

The table shows that the gross originating receipts of the parties to the pool have risen from £38,771,139 in 1933-4 to an estimated figure of £42,351,000 for 1938-9. The difference between these two figures represents the general growth of travel and the results of the additional transport facilities provided to meet the growing demands of the traffic in London. The amount received by the board for operating allowances in the same years has risen from £18,419,614 to £20,222,000, while the main-line companies' figures are £4,156,884 and £4,455,000 respectively, these increases being due to additional mileage, increased rates of wages, and increased prices paid for materials. So far as the additional allowances are concerned, it is estimated that the board will receive £272,000 in 1938-9 and the main-line companies £180,000, both compared with no allowance in 1933-4, figures which are indicative of the additional capital expenditure which has been incurred by the parties since that date. As the share of the net pool has risen in the case of the board from £10,041,442 in 1933-4 to £10,696,000 in 1938-9 and that of the main-line companies from £6,153,199 to £6,526,000 in the same years, the total receipts of the board after pooling have risen from £28,461,056 to £31,190,000 (9·59 per cent.), and those of the main-line companies from £10,310,083 to £11,161,000 (8·54 per cent.).

Sir William Wood has standardised the figures for the main-line companies on the basis of the first year's working, 1933/4 (adjusted to represent the actual position), and the results are shown in Table II. These indicate that while the total receipts of the four main-line companies in 1938/9 after pooling are estimated to be 8·54 per cent. above those in 1933/4, their operating and additional allowances increased by 17·93 per cent. and the companies' net share of the pool by only 2·73 per cent. It will be appreciated that the estimates for 1938/39 are based on experience of a part of the year only.

Furthermore, a comparison of the fifth and seventh columns reveals the somewhat disturbing fact that, while their operating and additional allowances which, as explained above, do not fully cover their costs, have steadily increased throughout the period, the companies' share of the net pool increased only until 1935/6, since when it has shown a downward tendency in relation to their total receipts after pooling. The board's results show a similar tendency.

Table II.—STANDARDISED FIGURES FOR MAIN-LINE COMPANIES

—	Total receipts after pooling	Standardised on 1933/34	Operating and additional allowances	Standardised on 1933/34	Share of net pool	Standardised on 1933/34
	£		£		£	
1933/34 (adjusted)	10,282,778	100·00	3,930,279	100·00	6,352,499	100·00
1934/35 (adjusted)	10,709,067	104·15	3,986,164	101·42	6,722,903	105·83
1935/36 ..	10,851,916	105·53	4,117,818	104·77	6,734,098	106·01
1936/37 ..	11,073,677	107·69	4,349,962	110·68	6,723,715	105·84
1937/38 ..	11,131,088	108·25	4,440,909	112·99	6,690,179	105·32
1938/39 (estimated)	11,161,000	108·54	4,635,000	117·93	6,526,000	102·73

Table III.—STANDARDISED FIGURES FOR L.P.T.B.

—	Total receipts after pooling	Standardised on 1933/34	Operating and additional allowances	Standardised on 1933/34	Share of net pool	Standardised on 1933/34
	£		£		£	
1933/34 (adjusted)	28,488,361	100·00	18,121,682	100·00	10,366,679	100·00
1934/35 (adjusted)	29,087,120	102·10	18,069,788	99·71	11,017,332	106·28
1935/36	29,754,423	104·44	18,718,745	103·29	11,035,678	106·45
1936/37	30,304,252	106·37	19,285,587	106·42	11,018,665	106·29
1937/38	30,989,091	108·78	20,025,386	110·51	10,963,705	105·76
1938/39 (estimated)	31,190,000	109·48	20,494,000	113·09	10,696,000	103·18

THE HIAWATHA OF THE MILWAUKEE ROAD

A description of the 4-4-2 and 4-6-4 streamlined locomotives and the rolling stock built to operate the Hiawatha Express between Chicago and the Twin Cities of St. Paul and Minneapolis, the pioneer high-speed steam train of America, the schedule of which requires the regular attainment of over 100 m.p.h.

ON May 29, 1935, the Chicago, Milwaukee, St. Paul & Pacific Railroad of America put into service the Hiawatha, a streamlined steam-hauled express, designed to compete with the Chicago & North Western and Chicago, Burlington & Quincy Companies for the traffic between Chicago and the Twin Cities of St. Paul and Minneapolis. From St. Paul to Minneapolis speeds are severely restricted, and the high-speed running of the three competitors therefore takes place between Chicago and St. Paul, 396 miles apart by the North Western route, 411½ miles over the westbound and 410½ miles over the eastbound track by the Milwaukee route, and 431 miles by the Burlington route. For this distance 6½ hours are allowed, including stops, by most of the competing services. From the first the Burlington Zephyrs were diesel-operated trains, and in a short time the patronage justified a doubling of the service by the provision of a morning Zephyr in addition to the evening Zephyr. The North Western established its service, known as The 400, with standard Pacific locomotives and standard stock, which now, however, are about to be replaced by streamlined diesel trains. The Milwaukee built streamlined steam locomotives of a special design to work the Hiawatha. The original Hiawatha locomotives, two in number, built by the American Locomotive Company at its Schenectady works, appeared in 1934, and two more engines of the same type were built later. In August, 1938, the American Locomotive Company turned out six much larger locomotives, of the 4-6-4 type, to be used chiefly on such heavy sleeping-car trains as the Olympian and the Pioneer Limited, not only between Chicago and Minneapolis, but also without change of engine over the 914 miles between Minneapolis and Harlowton, Montana, as well as on the Hiawatha service when required, especially when the standard formation is increased.

Such demands on tractive power as are embodied in the schedule of the Hiawatha have never been imposed before as a daily timetable proposition on steam power. It is the only steam-hauled express in the world which must regularly attain maximum speeds of 100 m.p.h. at several points on its journey if time is to be kept, and as will be seen later in this article, both the 4-4-2 and 4-6-4 locomotives find no difficulty in attaining this speed on level track with loads of 450 tons and upwards behind the tender. As with the Burlington Zephyr, increasing patronage has encouraged the Milwaukee to institute morning and evening Hiawatha services, of which the schedules are set out on page 940. The fastest point-to-point run, until the establishment of the morning Hiawatha, was from New Lisbon to Portage, 43·1 miles in 35 min., at 73·9 m.p.h. start-to-stop, and for a long time this was the fastest scheduled run in the world for which steam power was responsible. But the morning Hiawatha service, as mentioned in our March 17 issue, has introduced a faster run, from Sparta to Portage, 78·3 miles in 63 min., at 74·6 m.p.h. start-to-stop. Included in this length, as pointed out by a correspondent in THE RAILWAY GAZETTE for March 24, is a climb of 251 ft. in 9¾ miles, largely at 1 in 200 and finishing at 1 in 150, in the middle of which comes a 40-m.p.h. slack to take a stretch of 2¾ miles of single track, at the end of which a second 40-m.p.h. slack is imposed. Through Camp Douglas, 16 miles further on, there is a 50-m.p.h. slack for a level crossing with another railway, and there are four other slacks, one to 70 m.p.h., and three nominal reductions to 90 m.p.h. For the maintenance of such a schedule, therefore, speeds of 95 to 100 m.p.h. on the level sections are essential, with very rapid acceleration from service slacks.

Design of Passenger Equipment

The problem of haulage has been simplified by the use of special lightweight streamlined stock, of which three different varieties have been introduced; the original cars of 1934, new sets introduced in 1935, and 35 new cars turned out towards the close of 1938 in anticipation of the duplicated service of 1939. The original six-car Hiawatha trains weighed 313 long tons* and seated 376 passengers; the latest nine-car formations weigh 430 tons and seat 499 passengers. The original 52 tons a car, which was very light for the general American standards then prevalent, has thus been brought down to 48 tons, and it is estimated that the new cars save 40 per cent. in weight compared with standard cars of normal (not alloy) riveted steel construction. They are, indeed, the lightest vehicles in use in America on main line service with steam haulage. This result has been secured largely by the use of Cor-Ten high-tensile steel and of welding. Of the new cars the bogies are a special feature. They are of the swing-link bolster type, with Timken roller bearings, but the normal elliptical springs are replaced by large triple-coil alloy steel spring groups, supplemented by Monroe hydraulic shock-absorbers between the bolster and the spring plank, to damp out vertical oscillation. A system of equalising bars across the bogie frame, connected to the bolster by swing hangers, also steadies the bolster and keeps it level by transferring and equalising the unbalanced load on the bolster springs due to track irregularities. Rubber, in the form of pads and bushings, many in unusual places, is also used extensively in each bogie to damp out vibration and reduce shock and noise.

Each nine-car set comprises an express (baggage)-buffet composite car, four luxury cars for "coach" passengers, a café-dining car, two parlour cars, and a parlour-observation car; at times the formation is strengthened to meet special passenger demand, and trains up to fifteen cars (over 700 tons) have been run on this schedule. As to bodywork, the roof construction of the new cars is circular instead of elliptical, and continuous longitudinal members are used above the windows to give greater lateral stiffness. Window openings are cut out of the side-sheets with a special torch, and there are three longitudinal corrugations in the side sheets, extending the full length of each car below the windows, and two more above, to give added strength to the car bodies. Among novel

* All weights are given in tons of 2,240 lb.

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features in each train are an improved air-conditioning system, the application of a plastic sound-deadening insulation to all internal metal surfaces; improved lighting with glare-eliminating louvres fitted to the focused lenses, and an illuminated station announcer in the cocktail lounge, operated by a selector switch at the conductor's desk in the rear end of the car. The beaver tail of the observation car is of unique construction. It has a central vertical fin projecting externally, with four horizontal fins arranged transversely, three above and one below the window level. Not only has this form of construction decorative value, but the upper fins shield the rear windows from the sun, and the whole device adds considerable strength to the end of the train, and forms a substantial protection in the event of rear-end impact. The internal decoration of the observation lounges, as indeed of the entire trains, is very striking. The whole of this stock has been built in the railway company's own shops at Milwaukee.

4-4-2 Type Locomotives

The four Atlantic locomotives used on the Hiawatha streamliners were designed expressly for this service by Mr. C. H. Bilty, the Chief Mechanical Engineer of the Milwaukee Company. As it was decided to work the engines through between Chicago and Minneapolis, a 7-hr. run, and the brief stops would not permit any cleaning of the ashpan *en route*, oil firing instead of coal firing was decided on, for the Indiana bituminous coal used on the Milwaukee has the high ash content of 9.3 per cent. The firebox is of welded steel construction throughout. The unusually large driving wheel diameter of 7 ft. was arranged to allow speeds in excess of 90 m.p.h. to be maintained continuously on level track. Driving the leading coupled axle of a four-coupled locomotive is also unusual in American practice. Another special feature is the foundation brake, designed by the American Brake Company particularly with a view to dissipating rapidly the large amount of energy stored in a locomotive travelling at 90 m.p.h. and over. Clasp brakes are applied to each of the locomotive wheels, the ratios being respectively 45 per cent. for the leading bogie, 78 per cent. for the driving wheels, and 60 per cent. for the trailing wheels, based on a pressure of 50 lb. per sq. in. in the brake cylinder. For the train brakes the engine is fitted with Westinghouse air-brake equipment.

The locomotive is built on a cast steel frame, of which the cylinders, smokebox saddle, and main brake reservoir form integral parts. To reduce the weight of the motion parts to a minimum, the connecting rods are of high-tensile nickel steel, and the eccentric rods and cranks of the valve-gear are channelled in order to keep down the weight on the main crank-pins. The total reciprocating weights on one side of the engine add up to 1,003 lb. (9 cwt.) of which one-third are balanced. Steam is distributed to the cylinders by 10 in. diameter piston valves, actuated by Walschaerts motion; the maximum valve-travel is 6½ in., and the cut-off in full gear 85 per cent. As to setting, the steam lap is 1½ in., exhaust clearance ¼ in. lead ½ in., width of ports 2 in., and distance between ports 24 in.; this valve-setting is typical of modern American practice. The bogie axles are hollow bored, and S.K.F. roller bearings are used for these and the driving axle journals, with Timken roller bearings for those of the trailing wheels, and also for the tender axles. The tender is carried on a six-wheel bogie at the leading end, and a four-wheel bogie at the trailing end. Principal dimensions of the Hiawatha Atlantics figure in Table B.

4-6-4 Type Locomotives

The principal aim of Mr. C. H. Bilty in designing the much more powerful Hudson-type locomotive was, as previously mentioned, the working of such expresses as the Olympian and the Pioneer Limited, which are not timed at so high a speed as the Hiawatha, but which vary in formation from ten to twenty-one standard cars, or 715 to 1,340 tons behind the engine tender. It was also desired that the 4-6-4 locomotives should be able to take their turn with the Hiawatha when necessary. Streamlining, of the spread wing design which gives a distinctive appearance to the front end of the Hiawatha Atlantics, has been applied, but in consequence of weight restrictions, which limit axle-loads to a maximum of 32 tons, the entire boiler has not been covered as in the 4-4-2 engines. A cowl extends from the front end, and flows into the cab, thus covering the chimney, sandbox, dome, safety-valves and other boiler mountings, but from the bottom of this cowl to the running board there is the normal clothing of the boiler barrel. Also to save weight, the skirting below the running-plate, which in the Atlantics is carried down to the centre of the driving wheels, is in the 4-6-4s cut sufficiently high to clear the driving wheels entirely, and facilitate inspection and maintenance of wheels and motion. Coupler, bell, steam whistle, air horn, and headlight are all recessed in the nose of the locomotive, and the rounded front, sloping at an angle of 16 degrees to the vertical, in addition to its exhaust-lifting valve, is found very effective in winter-time as a snow plough.

The cab is specially designed to improve the look-out for the crew. At each side there is only one narrow corner-post, the whole of the upper part of the cab side sheeting being of shatter-proof glass, one half of which is arranged to slide inside the other half for opening. A vestibule and flexible connection lead from the cab to the tender, the rear end of which also is fitted with a

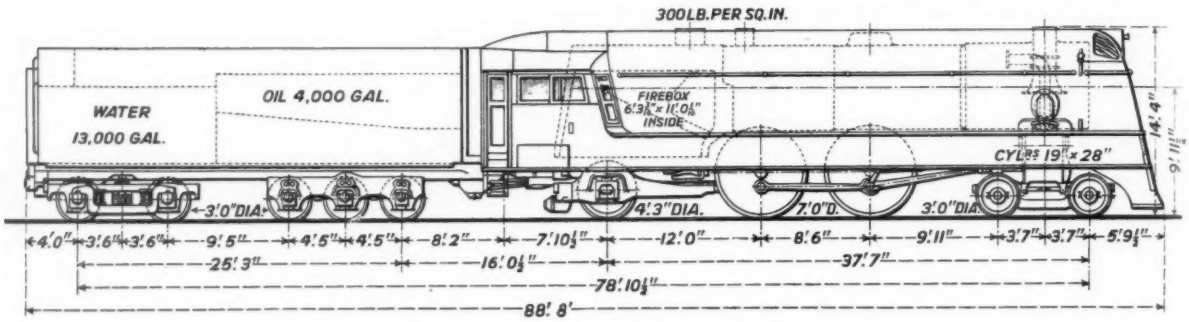
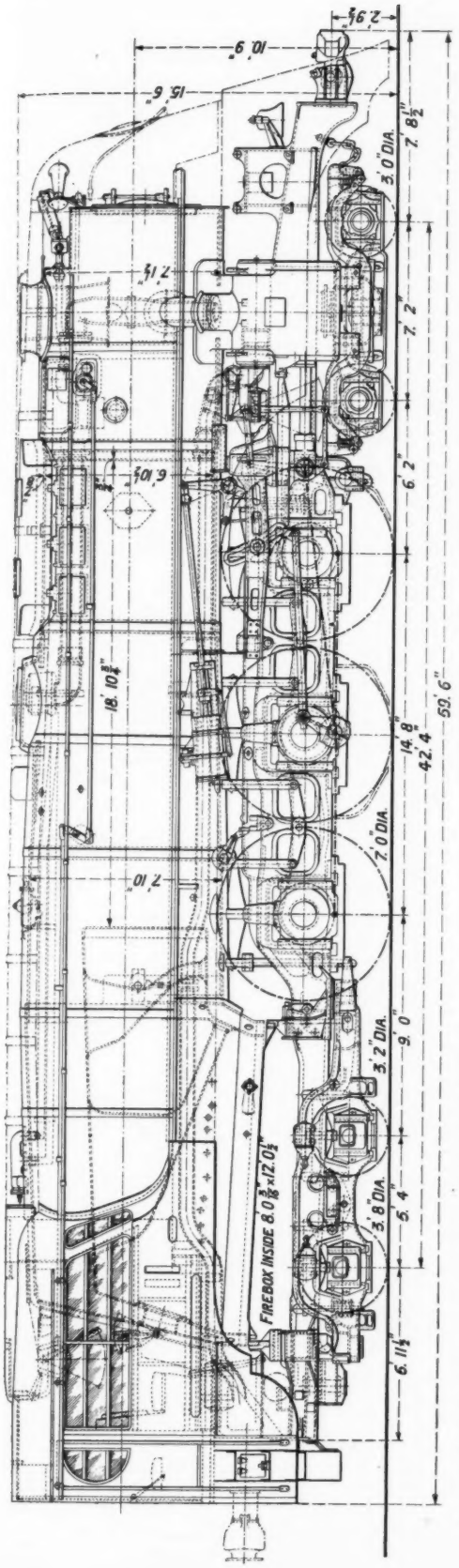


Diagram of 4-4-2 type locomotives for Hiawatha express



Detailed drawing of Hudson locomotives, built by the American Locomotive Company in 1938. These are primarily for heavy sleeping car trains, but also take turns on the Hiawatha

dummy vestibule, similar in form to that of the standard L.N.E.R. corridor tender, for coupling up to the train. For warmth in winter weather the cab is insulated and provided with steam heaters. There are Spongex upholstered seats for both enginemen, and an additional pair of seats behind these for officials who may require to travel on the engine. For neatness and cleanliness, as much as possible of the piping on the back of the firebox has been concealed beneath the covering.

Cast steel has been freely used in the design; as with the Atlantics, the engine bed casting includes cylinders, piston-valve chests, smokebox saddle, air-brake reservoir, cross-ties, and brackets; the tender water bottom, and the leading and trailing bogie frames of both engine and tender are steel castings. The engine bed casting weighs 26¾ tons and the tender water bottom casting nearly 15 tons. The cylinders drive the middle pair of coupled wheels, which are again 7 ft. in diameter; and are supplied with steam by 12 in. piston valves, having 7½ in. travel, 1$\frac{5}{16}$ in. outside lap, ¼ in. exhaust clearance, and $\frac{5}{16}$ in. lead in full gear. The piston rods, of 5 in. diameter, are of medium carbon steel, normalised and tempered, with multiple-bearing crossheads and guides, and low-carbon nickel steel connecting rods and coupling rods, normalised, quenched, and tempered. Medium carbon steel crankpins are used, and these are hollow-bored. At all coupled wheels the revolving weights are cross-counterbalanced; the total weight of the reciprocating parts on each side is 1,681 lb., the overbalance being 196 lb. on each wheel. The hammer blow at 84 m.p.h. is 9,400 lb. in each wheel. Boxpok wheel centres are used, with the American Locomotive Company's lateral motion device on the front pair of coupled wheels. For the pressure grease lubrication of various parts of the locomotive and tender 292 Alemite fittings are used. Forced lubrication is applied to the driving axleboxes and guides, cylinders, piston valves, automatic stoker, and air pumps.

The boilers, which carry 300 lb. per sq. in. pressure, are built in three sections, of which the middle one is conical; the inside diameter of the first ring is 6 ft. 10½ in., and the outside diameter of that next the firebox is 7 ft. 10 in. The three barrel courses and the dome are of silico-manganese steel with a maximum tensile strength of 36½ tons per sq. in. Of the firebox, which is completely welded, the roof and sides also are of silico-manganese steel; the firebox is 8 ft. 0¼ in. wide by 12 ft. 0½ in. long, and has a combustion chamber 3 ft. 8½ in. long. It is provided with two thermic syphons and has two 3½ in. diameter arch tubes which, with the syphons, support the brick arch. The boiler barrel contains 164 3¾-in. diameter flues and 60 2¼-in. tubes; over tubeplates it measures 19 ft. Bituminous coal from Indiana, with a heat value of 11,840 B.Th.U., is burned on the 4-6-4 engines, and is conveyed to the firebox, which has a firebox grate with an area of 96·5 sq. ft., by a modified Type "B" standard mechanical stoker. According to the particular trains handled, consumption varies from 8·8 to 12·3 lb. per passenger car-mile, with an average of 10·15 lb. The multiple type of exhaust nozzle is used, with a net area of discharge opening of 38 sq. in.; in conjunction the Anderson type of spark-eliminator is fitted, and although netting does not form a part of this device, it is very effective in preventing spark-throwing. The inside diameter of the chimney at its narrowest point is 23½ in. Arrangements are made to carry the air compressor and feed pump exhaust to a discharge at the rear of the chimney, and a V-shaped baffle is used to muffle the sound. Among various boiler fittings are a Barco low-water alarm, Wilson sludge-remover, and blow-off cocks. The regulator is built into the header of a Type

"E" superheater. Leading dimensions of the 4-6-4 engines appear also in Table A.

In summer a section of the Hiawatha leaves the main

TABLE A.—LEADING DIMENSIONS OF STREAMLINED 4-4-2 AND 4-6-4 LOCOMOTIVES, CHICAGO, MILWAUKEE, ST. PAUL AND PACIFIC RAILROAD

	4-4-2	4-6-4
Type	1934	1938
Date of introduction		
Cylinders (2), diameter	19 in.	23½ in.
,, stroke	28 in.	30 in.
Driving wheels, diameter	7 ft. 0 in.	7 ft. 0 in.
Wheelbase, coupled	8 ft. 6 in.	14 ft. 8 in.
,, total engine	37 ft. 7 in.	42 ft. 4 in.
Heating surface, tubes and flues	2,951 sq. ft.	3,708 sq. ft.
,, ,, firebox	254 ,,	367 ,,
,, ,, thermic syphons	40 ,,	91 ,,
,, ,, total evaporative	3,245 ,,	4,166 ,,
Superheating surface	1,029 ,,	1,695 ,,
Firegrate area	69·0 ,,	96·5 ,,
Working pressure, per sq. in.	300 lb.	300 lb.
Tractive effort (at 85 per cent. working pressure)	30,685 lb.	50,300 lb.
Adhesion weight	62½ tons	96½ tons
Weight of engine in working order	125½ ,,	185¼ ,,
Water capacity of tender	13,000 gal.	20,000 gal.
Oil fuel capacity of tender	4,000 ,,	—
Coal capacity of tender	—	25 tons
Weight of tender, loaded	110½ tons	167¼ ,,
Weight of engine and tender in working order	236 ,,	352¾ ,,

Milwaukee—St. Paul line at New Lisbon, and is worked over a secondary line through the Wisconsin Valley to Star Lake. In order that a locomotive may be available harmonising in appearance with the stock, an old 4-6-0 locomotive, built in 1900 as one of a series of 25 Vauclain compounds, and rebuilt in 1926 as a 2-cylinder simple, has received a streamlined casing similar to that of the new 4-4-2 engines.

Performance of Atlantics

The schedule to which the Hiawatha trains are worked is as set out in Table B. Of the four workings the hardest is the eastbound morning Hiawatha, which makes seven intermediate stops, totalling 19 min., in the overall allowance of 6½ hr. for the 410·5 miles from St. Paul to Chicago. In accordance with American practice, there are margins for recovery of lost time, such as about 2 min. from River junction to La Crosse, 3 min. from Brookfield to Milwaukee, and 5 min. from Pacific junction to Chicago; and when the slow running enforced in the vicinity of certain of the larger cities is allowed for, many of the sectional bookings are of necessity at a very high average speed. Actually this train is booked to cover 250 miles of its daily journey at an average speed of 77·4 m.p.h. The fastest pass-to-pass booking, shared with the afternoon Hiawatha, is on the Milwaukee—Chicago section, where the 57·6 miles from Lake to Signal Tower A.20 are booked in 40 min., at an average of 86·4 m.p.h. This train is normally hauled by one of the 4-6-4 locomotives, and the afternoon Hiawatha, making six stops between St. Paul and Chicago, by one of the original Atlantics. In the reverse direction the afternoon Hiawatha, Atlantic-hauled, is booked over the 57·6 miles from Tower A.20 to Lake in 38 min., at the remarkable average speed of 90·9 m.p.h., but has a recovery margin of 6 min. from Lake into Milwaukee, and a similar margin of about 8 min. from Hastings into St. Paul. A second portion is run daily from Chicago to Milwaukee at 1.5 p.m., carrying local passengers, in exactly the same point-to-point times. The westbound morning Hiawatha,

TABLE B.—SCHEDULE OF HIAWATHA SERVICES, C.M.ST.P. & P.R.R.

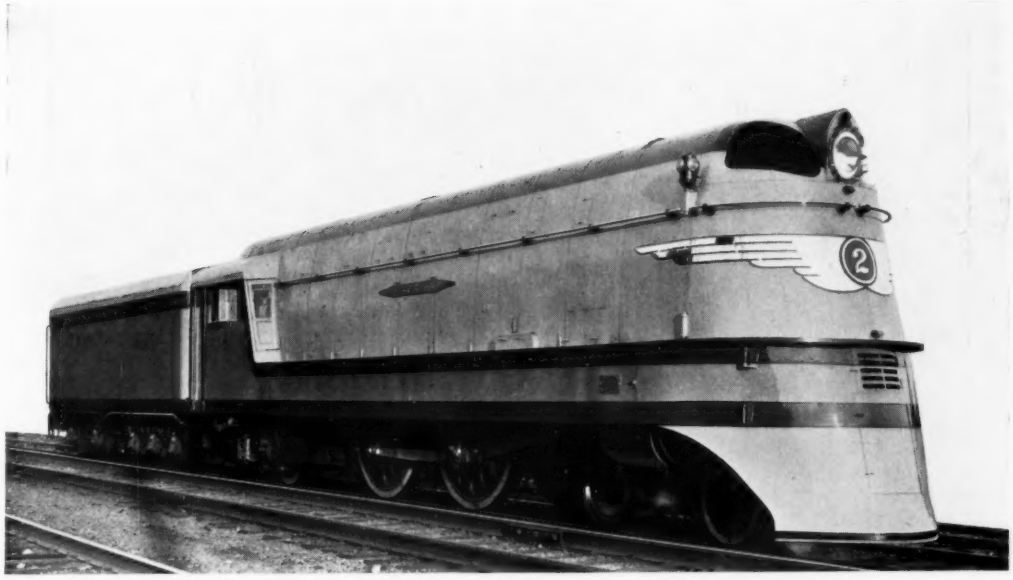
Distance			Eastbound				Westbound	
			Morning Hiawatha		Afternoon Hiawatha		Afternoon Hiawatha	
Miles			a.m.	m.p.h.	p.m.	m.p.h.	p.m.	m.p.h.
†0·0	ST. PAUL	dep.	8·25	*	1·00	*	7·30	41·0
†19·6	Hastings	pass	8·48	51·1	1·22	53·5	6·59	76·5
40·6	Red Wing	arr.	9·08	63·0	pass	—	pass	—
40·6	,, ,,	dep.	9·09	—	1·43	60·0	6·43	63·0
70·0	Wabasha	pass	9·36	65·3	2·09	67·8	6·15	66·0
103·0	Winona	arr.	10·08	61·9	2·40	63·9	5·45	—
103·0	,,	dep.	10·09	—	2·41	—	5·44	61·0
126·4	*River junction*	pass	10·30	66·9	3·03	63·8	5·21	28·3
129·7	LA CROSSE	arr.	10·38	24·8	3·11	24·8	5·14	—
129·7	,, ,,	dep.	10·43	—	3·16	—	5·09	63·2
154·3	Sparta	arr.	11·03	73·8	pass	—	pass	—
154·3	,,	dep.	11·04	—	3·37	70·3	4·46	78·0
167·3	Tunnel City	pass	11·17	60·0	3·48	70·9	4·36	74·0
183·5	Camp Douglas	,,	11·29	81·0	4·00	81·0	—	—
189·5	New Lisbon	arr.	pass	—	4·07	51·4	4·18	—
189·5	,, ,,	dep.	11·34	72·0	4·08	—	4·17	71·3
215·7	Wisconsin Dells	pass	11·53	82·7	4·29	74·9	—	—
232·6	PORTAGE	arr.	p.m. 12·07	72·4	4·43	72·4	3·41	—
232·6	,,	dep.	12·12	—	4·46	—	3·38	66·0
248·0	East Rio	pass	12·26	66·0	5·00	66·0	3·24	71·9
260·8	Columbus	arr.	12·36	76·8	pass	—	—	—
260·8	,,	dep.	12·37	—	5·09	85·3	—	—
279·5	Watertown	arr.	pass.	—	5·24	74·8	pass	—
279·5	,,	dep.	12·52	74·8	5·25	—	2·58	79·2
292·7	Oconomowoc	pass	1·02	79·2	5·36	72·0	2·48	79·7
311·3	Brookfield	,,	1·16	79·7	5·51	74·4	2·34	50·1
325·5	MILWAUKEE	arr.	1·35	46·4	6·10	46·4	2·17	—
325·5	,,	dep.	1·40	—	6·15	—	2·15	28·8
332·6	Lake	pass	1·49	47·3	6·24	47·3	2·00	96·6
348·7	Sturtevant	,,	2·01	80·5	6·36	80·5	1·50	87·2
367·6	Wadsworth	,,	2·14	87·2	6 49	87·2	1·37	90·9
378·2	Rondout	,,	2·21	90·9	6·56	90·7	1·30	90·0
390·2	*Tower A20*	,,	2·29	90·0	7·04	90·0	1·22	68·8
405·1	Pacific junction	,,	2·42	68·8	7·17	68·8	1·09	36·0
410·5	CHICAGO	arr.	2·55	24·9	7·30	24·9	1·00	*

* Speeds in these columns are average speeds between timing points

† From Hastings to St. Paul by the westbound track is 20·6 miles

however, is not such a fast train; it is allowed 7 hr. 50 min. from Chicago to St. Paul, though this includes sixteen intermediate stops, and many of the start-to-stop runs are very sharply timed. Indeed, the 280·8 miles from Chicago to La Crosse must be covered in 305 min., including 10 min. at Milwaukee, 5 min. at Portage, and eight other intermediate stops. This also is a 4-6-4 locomotive duty. Each of the Hiawatha workings continues from St. Paul to Minneapolis, and *vice versa*, but owing to many speed restrictions it is necessary to allow 25 min. for the 10·9 miles between the two cities.

A typical run with one of the 4-4-2 engines hauling the afternoon Hiawatha is set out in Table C. The portion of the journey shown is from Chicago to La Crosse, the lower speed between La Crosse and St. Paul making the final section less interesting. Before this schedule first became effective, considerable attention was devoted to the track. The route is laid mainly with the A.R.E.A. standard 131 lb. per yd. flat-bottom rail, but some lengths of the previous 110 and 120 lb. rail still remain. Curves in radius down to 87 ch. have no limitation of speed, provided that they are canted at least 2½ in.; with the same super-elevation curves of 44 ch. radius may be taken at speeds up to 75 m.p.h. In the 411½ miles from Chicago to St. Paul there are 58 speed restrictions, eleven to between 30 and 40 m.p.h., four to between 40 and 50 m.p.h., eight to between 50 and 60 m.p.h., twenty to between 60 and 70 m.p.h., and fifteen nominal restrictions to between 70 and 90 m.p.h. When allowance is made for the time lost by service slacks, it is clear that the train must maintain a continuous average speed in running of over 80 m.p.h. for the major part of the journey, apart



Streamlined Atlantic for Hiawatha service (*see dimensioned drawing on page* 934)

from recovery of time lost by out-of-course checks. Of the latter there were several on the run under review, but in recovering the lost time, which included overtime at stations, a total gain of 35¼ min. on schedule was recorded with a train weighing some 465 tons behind the tender.

From Chicago slow travelling is enforced to Pacific junction, 5·6 miles (which took 9 min. 40 sec.), and after Mayfair there came the first permanent way check, costing 2 min. From this there was a rapid acceleration to 96 m.p.h. at Deerfield, and Rondout, 32·3 miles, was passed on time in 30 min., at a reduced speed of 80 m.p.h. Between Rondout and Wadsworth speed rose to 100 m.p.h., and continued between that and 94 m.p.h. to Russell. In the next two miles, too, very severe permanent way checks were experienced, one to 18 m.p.h. and the other to 27 m.p.h., which cost between them 7 min., and Sturtevant was passed 6¾ min. late. But in just over 8 min. speed rose from 60 to 100 m.p.h., and successive miles were covered at 103, 106, 103, and 103 m.p.h., with five miles further at between 97 and 102 m.p.h., speed averaging 100·7 m.p.h. for nine miles continuously. Over this stretch the engine was working at 28 per cent. cut-off, with the full boiler pressure of 300 lb., a steam-chest pressure of 285 lb., and half-a-glass in the water-gauge maintained unvaryingly; the superheat temperature was 700 deg. F. The regulator was about two-thirds

Semi-streamlined Hudson locomotive for heavy sleeping car trains, and Hiawatha services when required (*see also detailed drawing on page* 935)

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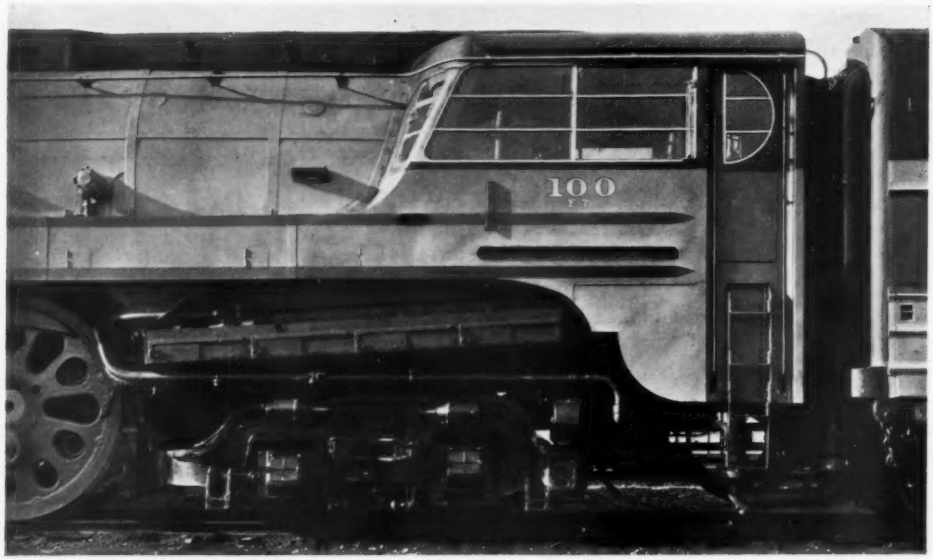
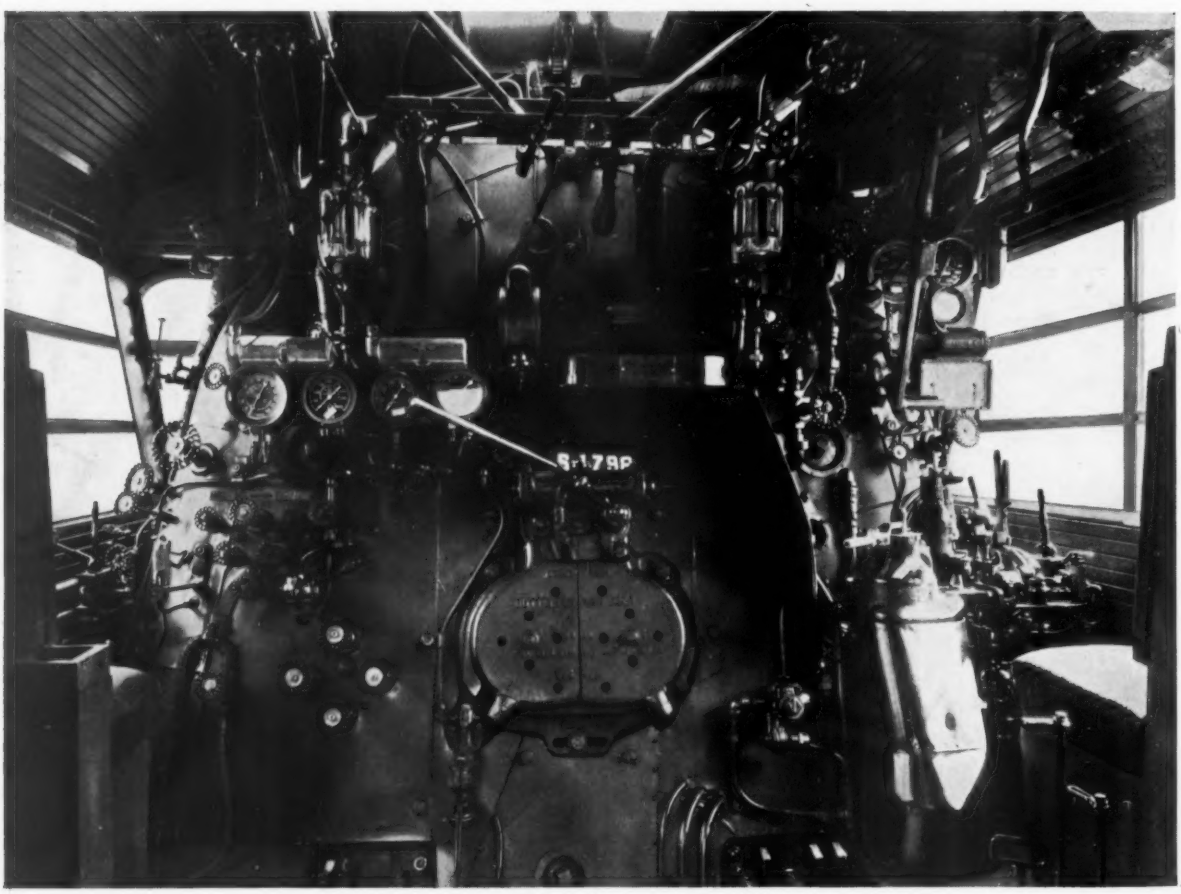


Accommodation for the crew on the streamlined Hudson locomotives which take turns with Atlantics on the Hiawatha is a cross between a cab and a conservatory. Note covered connection with tender



This interior view of a Hudson cab shows how the special design of windows improves the lookout. The whole upper part of the cab sides is of shatter-proof glass

open; an opening from one-half to two-thirds is customary. Baron Vuillet, who timed this run, comments appreciatively on the steadiness of the engine, on which he found it possible to write his notes at speeds round about the 100 m.p.h. mark without having to hold on. The train was barely 1¼ min. late into Milwaukee, having covered the 85·0 miles from Chicago in 76 min. 10 sec., or 67½ min. net, the latter indicating a start-to-stop average of 75·5 m.p.h.

After leaving Milwaukee, speed is limited to between 30 and 40 m.p.h. for 3·2 miles to Grand Avenue, and 50 m.p.h. for the next 2·2 miles to Wauwatosa, but then a speed of 68½ m.p.h. was attained and maintained up a grade which for 5 miles rises at 1 in 200, and by Pewaukee the train was doing 90 m.p.h. A slack to 70 m.p.h. was enforced through Hartland, after which a maximum of 100 m.p.h. was reached between Okauchee and Oconomowoc. Despite a permanent way slack and then a dead stand of 2 min. 30 sec. for signals before Watertown, and four 70 m.p.h. service slacks, the time for the 92·9 miles from Milwaukee to Portage was only 85 min. 18 sec., or 75½ min. net, the latter being 5½ min. inside schedule and showing a start-to-stop average of 73·8 m.p.h. The 43·1 miles from Portage to New Lisbon were run in 32 min. 30 sec. start to stop, at the remarkable average of 79·6 m.p.h., with a flying average of 97·8 m.p.h. over the 10·9 miles from Lyndon to Mauston, and a maximum of 102 m.p.h. The stretch of line from Portage to La Crosse includes, as previously mentioned, 2¾ miles of single line beyond Tunnel City, with a 40 m.p.h. speed restriction. After recovery from these slacks, for the sixth time on the journey speed was worked up to over 100 m.p.h.—102 m.p.h. down a gradient of 1 in 200 to 1 in 400 from Camp McCoy to Sparta, with an average of 98 m.p.h. between these stations—and there were several maxima of over 90 m.p.h. The 59·8 miles from New Lisbon to La Crosse, with three 40 m.p.h. slacks and one 50 m.p.h. slack, were run in 49 min. 35 sec., and the net time of 46 min. represented a start-to-stop average of 78·0 m.p.h. Overall, the 411·5 miles from Chicago through to St. Paul were completed in a net time of 342¾ min., at an average of 72·0 m.p.h. throughout, and the fact that this time is 35¼ min. less than the high-speed schedule of the Hiawatha shows the extent to which the Atlantics are masters of their work.

TABLE C.—THE HIAWATHA, C.M.St.P. & P.R.R.
LOG OF RUN FROM CHICAGO TO LA CROSSE
Streamlined 4-4-2 type locomotive. Load: 9 cars, 430 tons tare, 465 tons gross

Distance	——	Schedule	Actual	Speeds‡
Miles		Min.	Min. Sec.	M.p.h.
0·0	CHICAGO	0	0 00	—
2·9	Western Avenue	—	6 25	—
5·4	Pacific Junction	9	9 40	61
9·0	Mayfair	—	12 50	70
			p.w.s.	
14·3	Morton Grove	—	18 10	—
23·9	Deerfield	—	24 30	96
28·0	West Lake Forest	—	27 10	—
32·3	RONDOUT	30	30 00	*80
42·9	Wadsworth	37	37 08	100
47·0	Russell	—	39 55	94
			p.w.s. (2)	18
57·5	Somers	—	52 18	—
61·8	STURTEVANT	50	56 45	—
69·4	Caledonia	—	62 03	100
77·9	Lake	60	67 05	106
85·0	MILWAUKEE	75	76 10	—
5·4	Wauwatosa	—	8 20	*48
20·3	Pewaukee	—	21 25	90
24·9	Hartland	26	24 35	*70
29·8	Okauchee	—	28 20	—
32·8	Oconomowoc	31	30 12	100
			p.w.s.	—
38·5	Ixonia	—	35 30	73
			sig. stop	
46·0	WATERTOWN	41	48 40	—
55·6	Reeseville	—	57 10	†
64·7	Columbus	—	63 30	†
74·1	Doylestown	—	70 25	†
83·9	Wyocena	—	78 00	†
92·9	PORTAGE	81	85 18	
16·9	Wisconsin Dells	—	14 30	93
25·5	Lyndon	—	20 45	102
36·1	Mauston	—	27 15	—
43·1	NEW LISBON	36	32 30	—
6·0	Camp Douglas	—	6 45	*50
12·3	Oakdale	—	11 37	90
18·8	Tomah	—	15 45	96
22·2	TUNNEL CITY	18	18 35	*40
30·4	Camp McCoy	—	25 10	—
35·2	Sparta	28	28 10	102
			p.w.s.	40
41·8	Rockland	—	33 40	—
45·4	Bangor	—	37 10	93
50·0	West Salem	—	40 35	—
59·8	LA CROSSE	51	49 35	§

* Service slack
† Four 70-m.p.h. slacks are enforced between Watertown and Portage, and the maximum reached between them was 94 m.p.h.
‡ Max. and min. speeds, at points shown
§ 40-m.p.h. service slack outside La Crosse

Performance of New 4-6-4 Locomotives

Such complete records as the foregoing are not available in connection with the performance of the new 4-6-4 Milwaukee locomotives, but we are indebted to Mr. C. H. Bilty, the Chief Mechanical Engineer of the company, for some interesting particulars of high-speed running that have been verified. The self-recording speed indicator on one of these locomotives reveals that on one journey with the Hiawatha, a speed of over 100 m.p.h. was maintained for more than 19 miles between Chicago and Milwaukee, including 5 miles at 120 m.p.h.; a fall of ¾ mile at 1 in 150, ½-mile level, ¾-mile up at 1 in 300, a mile level, and 2 miles at 1 in 250 up, make up the above-mentioned 5 miles. A remarkable heavy load performance was on November 28 last, when the Pioneer Limited and Olympian expresses were combined into one train of 26 cars, weighing 1,904 tons behind the tender, and in 12 miles from a dead start were accelerated on the level to 70 m.p.h. These engines are exceptionally free in their steaming capacity, and at speed prove as steady in their riding qualities as the Atlantics that preceded them.

FIRST "EMPIRE SPECIAL" LEAVES NEW IMPERIAL AIRWAYS PRIVATE STATION.—At 8 p.m. on June 6 the first train, consisting of a composite coach, a Pullman car, and a van, and headed by Drummond 4-4-0 locomotive, No. 338, left for Southampton from the new private station of Imperial Airways Limited at Airways House, Buckingham Palace Road. This was the first time that air passengers were able to travel by special train from a private railway station attached to an air terminus. Passengers spend the night at the South Western Hotel, Southampton, and leave early next morning by flying-boat from Southampton for the East, Africa, and Australia. As there is no direct connection allowing of through running between Victoria and the Western Section of the Southern Railway at Clapham Junction, the outward journey is made by way of Balham and Tooting to Wimbledon, then down to Southampton by the Western section main line. In the return direction the trains are routed from Wimbledon *via* East Putney, Clapham Junction (Windsor side), and Longhedge.

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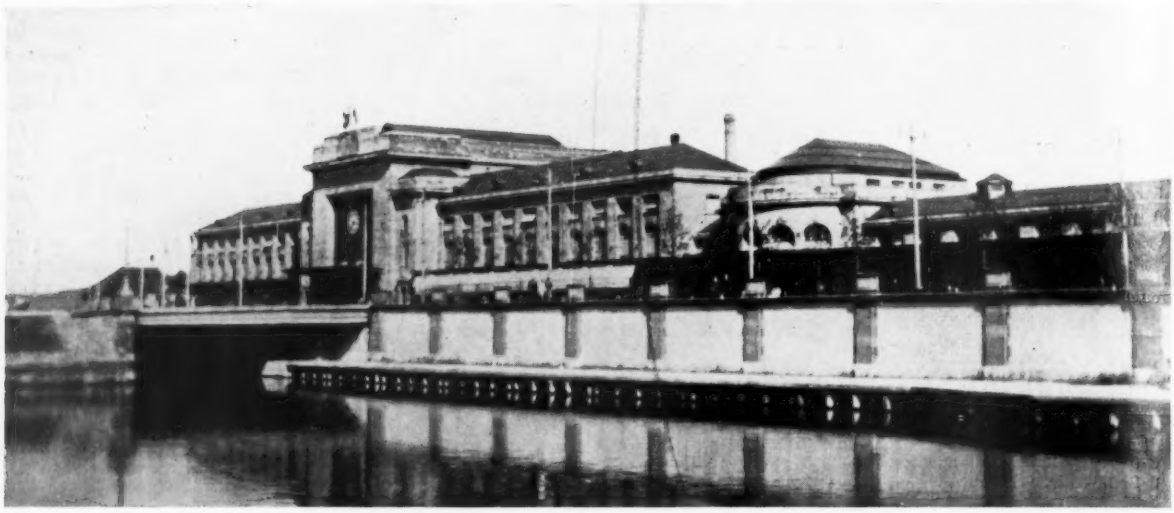
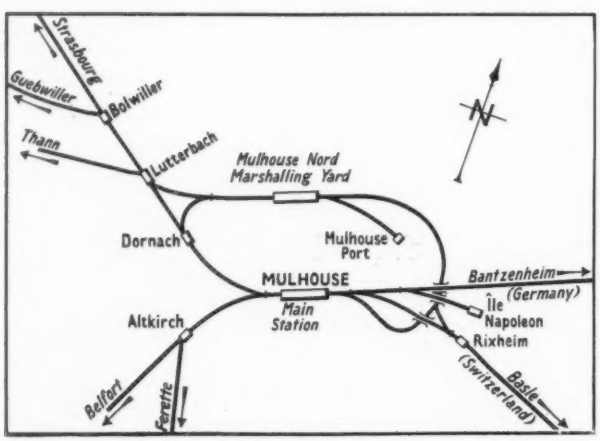
NEW STATION AT MULHOUSE, ALSACE

Reconstruction of an important junction station delayed by numerous obstacles



WITH the bringing into service of the electric power signalling equipment in August, 1936, the administration of the then Alsace-Lorraine Railways completed the work, which had been in progress for many years, of rebuilding the main station at Mulhouse, Alsace. This is an important interchange station on the main Strasbourg—Colmar—Basle line, and junction for the direct line to Paris *via* Belfort, with connections at Belfort to the rest of France. The lines in the vicinity are shown on the accompanying map, and the following brief particulars of the work are taken from an article by M. Henri Lang in the *Revue Générale des Chemins de fer*.

The first station in Mulhouse, necessarily a simple affair, was constructed in 1839 for the Mulhouse and Thann line, but a better one was made two years later with the opening of the Strasbourg and Basle Railway, the buildings of which, in spite of extensions and alterations, lasted until 1933. Although other cities in Alsace-Lorraine, such as Strasbourg, Metz, and Colmar, were provided with good, well-equipped stations many years ago, practically nothing of importance was done to give Mulhouse a station suited to the requirements of the traffic and the times. The reasons for this were far from being entirely technical. Nevertheless, the German administration did undertake improvements to the layout in the vicinity and was intending to transform the station entirely when these were finished. It had not completed the preliminary work by 1918, and the old station building remained standing when the French management took over. It was in a very bad condition, the war and the contemplated demolition having caused maintenance to be neglected. The result has been that the city has now obtained the best station in the two provinces.



Sketch map of the lines near Mulhouse

The old station was awkwardly placed, being hemmed in by buildings and the approach to two bridges, while direct access to the interior of the town was possible only *via* two swing bridges over the Rhine—Rhône canal, which were frequently open. There were five platform lines, two bay lines, and two through goods lines. A goods yard and locomotive sheds were built beyond the eastern, or Tivoli, bridge, but the inconvenience of the position and the bottlenecks east and west of the station proper, led to the goods traffic being diverted to a separate station in 1883, the line from Lutterbach to Mulhouse-Port being finished in 1886. A connection was also made from Mulhouse Nord to Rixheim. The Nord marshalling yard was not completely finished until 1930. In this way the goods working has been practically eliminated from the main station, but goods trains from Belfort pass through on their way to the marshalling yard.

About 240 trains, in and out, have to be dealt with every 24 hr. in normal times. For a long time the accommodation had been found insufficient to handle the traffic expeditiously. The scheme adopted was to rebuild the main station building parallel with the canal, covering it in for a length of 200 m. (219 yd.) and making direct access to the town, eliminating the swing bridges. The floor of the building was to be raised 4 m. (13 ft.) above the rails, with foot bridges and stairs to the plat-

forms. There was also to be a new postal building. In 1912 the plan received the sanction of the city, but only the postal building and a modification to the western, or Altkirch, bridge, were finished by 1919. The new management continued the scheme with a few modifications. The canal covering was retained but the station building moved back a little. Six platforms, served by 11 lines, were planned, with two locomotive lines and two goods lines.

The locomotive depot was removed to the Île Napoleon, as it is termed, 3 km. distant, and the space used for carriage stabling and washing and an improved express goods depot. At the same time four level crossings, becoming daily more and more of a nuisance, were replaced by bridges. Altogether the changes extended over a distance of 3 km., exclusive of the locomotive depot.

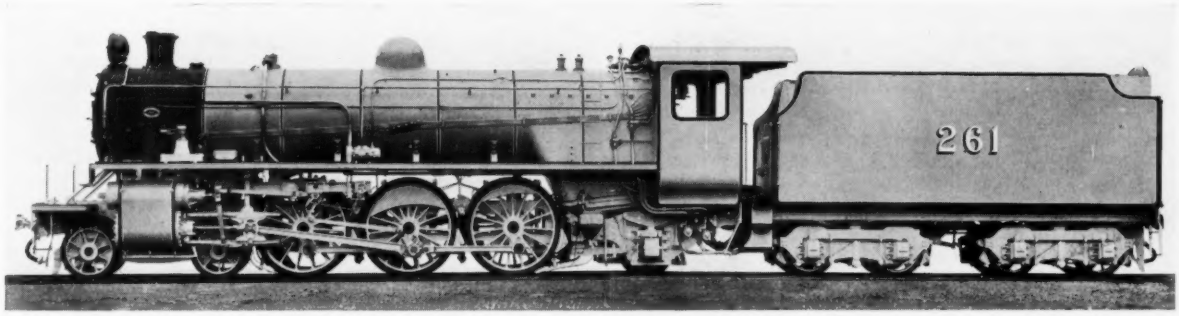
The new station building was in service by January, 1933. It is of very pleasing design, outside and in, and the accommodation is well arranged. Only five platforms out of the six planned have been built, leaving the other for future needs. All are on a level with the carriage foot boards, save one serving purely local traffic. All have concrete umbrella roofs. Concrete footbridges, one for departure, the other for arrival, lead from the main building, and buffet and waiting room accommodation is provided under the staircases in addition to that in the main building. Luggage and postal traffic is dealt with in subways. The central heating also serves to pre-heat trains in winter.

The signalling is all-electric, with three signal boxes, West, Central, and East, with all points trailable, as the German system of shunting is still used in Alsace-Lorraine; control of traffic movements is by supervisors in West, and Central boxes. The signals are electrically lighted and there are some colour-lights, mounted on Vierendeel type gantries.

The usual Siemens lock-and-block system, commonly used on these lines, and electric signal gongs are retained. Accumulators provide for 12 hours standby in case of a power supply failure. The installation has given every satisfaction and is the first of its kind in Alsace-Lorraine.

NEW 4-6-2 LOCOMOTIVE, GOLD COAST GOVERNMENT RAILWAY

These engines are of new design and built to the limitations of the 60-lb. track



General view of locomotive, showing bar-frame construction

AN order for seven 4-6-2 engines for 3-ft. 6-in. gauge has been completed by Beyer Peacock & Co. Ltd., for the Gold Coast Government Railway. The engines have been built to the special requirements of the Chief Mechanical Engineer, Major C. R. Turner, and under the supervision of the Crown Agents for the Colonies. They are of new design and built to the limitations of the 60-lb. track, special consideration being given to keeping the design as straightforward and simple as possible. The engines are operated entirely by African drivers, European enginemen not being employed on this railway.

The Gold Coast Government Railway, 500 miles in length, consists chiefly of two main lines, the one running from Takoradi Harbour and Sekondi to Kumasi; and the other from Accra, also on the coast, to Kumasi, distances of 164 and 190 miles respectively. The new engines will at first be used on passenger services between Sekondi and Kumasi, which section is laid with 80-lb. rail. Later they will work passenger services between Accra and Kumasi, a section to consist of 60-lb. rail throughout when the remaining section between Tafo and Mangoase, now 45-lb. rail, has been relaid. This is due for completion in about a year's time. The ruling gradient both on the 60- and 80-lb. rail sections is 1 in 80 inland and 1 in 100 towards the coast.

The leading dimensions of the locomotives are as follow:—

Cylinders (2), dia.	18 in.
Piston stroke	26 in.
Coupled wheels, dia.	5 ft.
Heating surface, tubes	1,222 sq. ft.
,, ,, firebox and arch tubes	136 sq. ft.
,, ,, total (evaporative)	1,358 sq. ft.
,, ,, superheater (inside)	332 sq. ft.
,, ,, combined	1,690 sq. ft.
Grate area	25 sq. ft.
Boiler pressure, per sq. in.	180 lb.
Tractive effort (at 75 per cent. boiler pressure)	18,950 lb.
Tender, water capacity	4,000 galls.
,, coal capacity	7·5 tons.
Total weight in working order	107·74 tons.

Coupled wheels of 5-ft. dia. have been selected as the most suitable size for the gradients and other conditions of service, and this should permit of a considerable speeding up in due course. The main frames are of the bar type, having the left and right hand cylinder castings bolted

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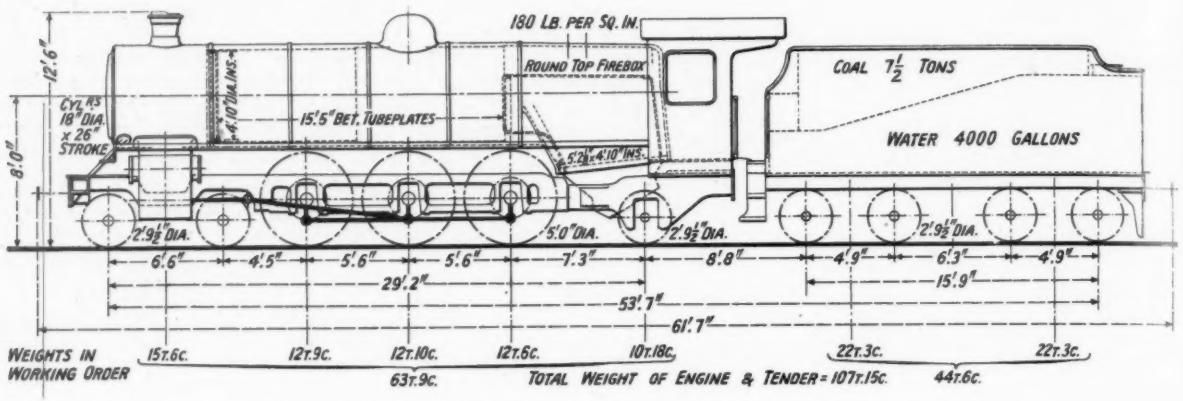
together on the centre line of the engine and forming a saddle for the smokebox. To accommodate the firebox a pair of carrying wheels is provided and the frame is widened by the provision of a robust steel casting at the end of the bar frames to which plate extensions are bolted. The carrying wheels are located in radial axleboxes with Cortazzi inclined sliding tops, providing the control to the rear of the engine; a total side play of 6 in. is arranged for. The leading four-wheeled bogie is of the sliding type and spring controlled; it also has a total side play of 6 in. Compensation is in two groups, namely, the leading and driving and the trailing and carrying wheels. The tender bogies, it will be noted, have plate frames with compensating beams and springs.



Dimensioned drawing of new Gold Coast Railway 4-6-2 locomotive

The boiler is of the round top type fitted with a copper firebox, having a combustion chamber. The tubeplates are 15 ft. 5 in. apart, and both the large and small tubes are of steel. The firebox shell and boiler barrel are gusset stayed to the back plate and smokebox tube plate. A M.L.S. superheater, manufactured by the Superheater Co. Ltd., is fitted, and a Lockyer regulator supplied by the A.B.C. Coupler and Engineering Co. Ltd., is fitted in the dome. The chimney is extended to form a petticoat. A spark arrester of the bar type is located on the blastpipe. The boiler and cylinders are clothed with blue asbestos mattresses manufactured by J. W. Roberts & Co. Ltd. Other equipment includes Ross pop safety valves, a Clyde soot blower for cleaning the tubes, and two Gresham & Craven No. 9 injectors, delivering through a combined heater stop valve on top of the boiler. The grate is fitted with ordinary bars and a drop grate under the tubeplate; the ashpan is of the dump type, its door being operated from the cab.

The cylinders, of cast iron, are fitted with pistons having three narrow rings. Piston valves 10-in. dia. and of the hollow trunk type are arranged for a valve travel of $4\frac{5}{8}$ in.; they are actuated by Walschaerts valve gear. The crossheads, of cast steel, are fitted with gun-metal slippers with special lubrication to the bottom bar. Reversing gear of the hand wheel and screw pattern is fitted. The lubrication of the cylinders is effected by a six-feed British Detroit hydrostatic lubricator. Two feeds are applied to each cylinder, one each to the barrel and the steam pipe adjacent to the steamchest. The other two feeds lubricate the metallic packing of the piston rods (this packing is supplied by the United States Metallic Packing Company Limited).

The four-wheeled bogie axleboxes, coupled axleboxes, trailing carrying axlebox bearings, tender axlebox bearings, crosshead slippers, connecting rod bushes and coupling rod bushes are of Cogwheel brand phosphor bronze lined with Ibis brand white metal. Armstrong oilers are fitted to these axleboxes. The coupled axleboxes and carrying wheel axlebox bearings are lubricated by an eight-feed Wakefield's mechanical lubricator located on the left hand side of the engine. Ordinary syphon lubrication is provided for such details as the bogie centres and axlebox slides, &c. A combined Super-Dreadnought automatic vacuum ejector, with steam brake valve made by Gresham & Craven Limited, is used for the train and tender; the latter also has a hand screw brake, and a steam brake operates on the engine coupled wheels. Gresham & Craven steam sanding is fitted to the front of the leading and rear of the trailing coupled wheels. The locomotive is equipped with Takoradi type couplers, and Visco No. 2 Alliance couplers have also been supplied. Other equipment includes Stone's electric lighting for the head, cab, and tail lights, with turbo-generator situated on the left-hand running board. A Hasler speed indicator and recorder is also fitted.

A Recent Italian Signalling Installation

An interesting example of the adaptation of modern signalling to local requirements is to be found at Cuneo, on the Ventimiglia—Turin line of the Italian State Railways, which is worked on the three-phase system of traction. A description—by Dr. D. Romano of the work appears in the *Annali dei Lavori Pubblici* for December, 1938. The station was recently rebuilt on a more convenient site, and opportunity was taken to put in full power signalling at the junction, about 3,500 yd. on the Turin side, where the Mondovi and Saluzzo branches diverge. The station itself is controlled by a traffic supervisor, who has a key interlocking apparatus in the centre of the layout, and two boxes, one at each end of the station where the siding lines lead in and out. The standard Italian two-position signal indications are used, with splitting home and distant signals of the searchlight pattern. The points are all locally worked and key locked, an arrangement frequently used in Italy at certain classes of stations, and the block is of the Cardani pattern. Signals are replaced to danger by treadles acting with short lengths of track circuit. As an air raid precaution, the supervisor can extinguish all signal lights save one red home light on each incoming route. A record is automatically kept of all movements made on the block instruments.

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IMPROVEMENTS AT KING'S CROSS, L.N.E.R.

Extensive alterations and improvements have been carried out in the modernisation scheme at this terminus

CONCURRENTLY with the work of brightening up the station buildings and providing a greater degree of passenger comfort and facility at Liverpool Street (described in THE RAILWAY GAZETTE of April 21), the L.N.E.R. has carried out improvements at King's Cross on almost identical lines. Although the main structure at King's Cross was built some twenty years before the opening of Liverpool Street, the cleaning-up process has left few signs of the difference in age. At King's Cross there is very little circulating area and practically all the public offices and rooms are concentrated along one platform (No. 10), which is nearly 1,000 ft. long, whereas at Liverpool Street the area space is on a fairly generous scale and the various public services are spread over the entire head of the terminus. Another difference between the two stations is that the platforms are numbered in opposite directions. At King's Cross, where the numbering is unusual for London termini in being from right to left, the sequence between No. 1 and 10 is broken because two of the reception lines which were so numbered have disappeared under schemes of improvement.

View along No. 10, the main departure platform at King's Cross, L.N.E.R. The neatness of the Gill sans lettering, which the company has standardised, will be noticed

Larger schemes of alterations at King's Cross concern the erection of a new building and a subway to certain platforms for facilitating mails and parcels business, and the important underground works at present being carried out by the London Passenger Transport Board to improve passenger connections between the main-line station and the Underground stations. A widening of the narrow island platform accommodating Nos. 7 and 8 platforms from 12½ to 24 ft. by absorbing No. 9 siding has relieved heavy congestion on these two platforms, where the intermixing of entraining and detraining passengers frequently led to restricted movement and confusion. A staircase is to be provided to the footbridge from the south side, and the widening of the platform will enable a lift connection to be made to the new subway for parcels and mails. Accommodation was found elsewhere for the rolling stock usually stabled temporarily in No. 9 siding.

The Main Departure Platform

Earlier stages of modernisation of the various amenities and facilities along No. 10, the main departure platform, were the provision of up-to-date inquiry and telegraph offices; a Georgian tea room to which an illuminated canopy has been added; the remodelling and enlargement of the buffet and restaurant, which also has been given an illuminated awning; the setting back of W. H. Smith & Son's bookstall and its reconstruction, incorporating the latest ideas for service and display inside as well as out; the re-siting and erection of a new tobacco and confectionery kiosk between the buffet and restaurant, which left a clearer entrance to the latter and, incidentally, concealed an unsightly goods lift entrance; the installation of the latest toilet conveniences; and the standardisation of the lower range of windows along the platform, combining a more pleasing design of framing.

Further and subsequent alterations within the interior of the main building include the erection of new uniform platform barriers with illuminated numbers and showing train-departure timings; the withdrawal of an out-of-date train indicator on the footbridge; the re-siting and erection of a new sub-bookstall side by side and in tone with a new attractive fruit shop facing Nos. 5 and 6 platforms; new ranges of telephone cabinets centralised inside the booking hall; a new letter-box with oak surround to harmonise with the improved surroundings (provided by the Post Office and re-sited to a position in front of the telegraph office); and the erection of two new show-cases.

In the redecoration of the public rooms, much forethought was directed to schemes giving the maximum of cheerfulness and comfort. An entirely new first class ladies' waiting room takes the form of a comfortable lounge, having been decorated with the latest mural Rexine, well carpeted and furnished with Lloyd Loom armchairs; toilet facilities adjoin. The third class ladies' room offers much the same degree of comfort, whilst the general room has been given a warmer and more inviting appearance. In the main-line booking office and hall new powerful lighting and indicator signs add to a far more general atmosphere of brightness.

The Local Station

On the local station two outstanding changes have been effected. The original buffet has been remodelled and made more attractive and comfortable with a new frontage incorporating a central tobacco kiosk, which displaced a kiosk close to the barriers and released space required for a new sub-bookstall moved along to make room for the booking office. The other alteration concerns the booking office, transferred from a position adjoining the entrance to the site formerly occupied by the bookstall against

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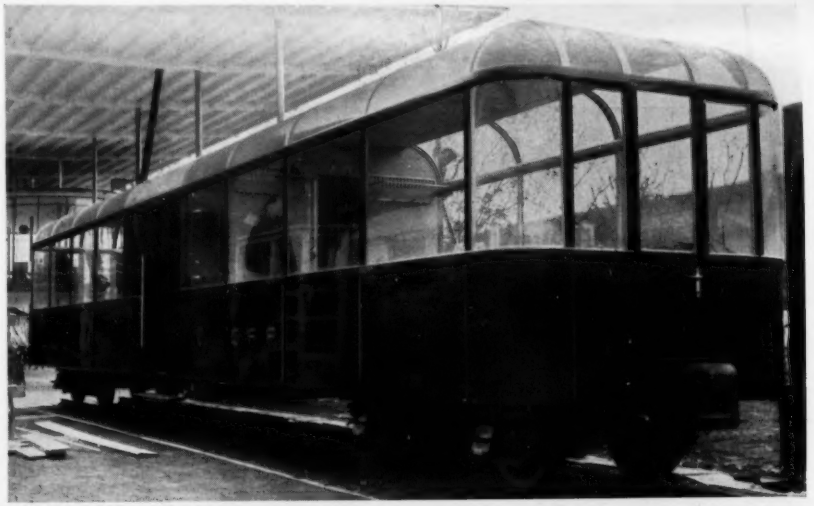
Left : The improved entrance to the suburban station ; and (right) section of new platform barriers on arrival side (note "windows" for train times beneath platform numbers)

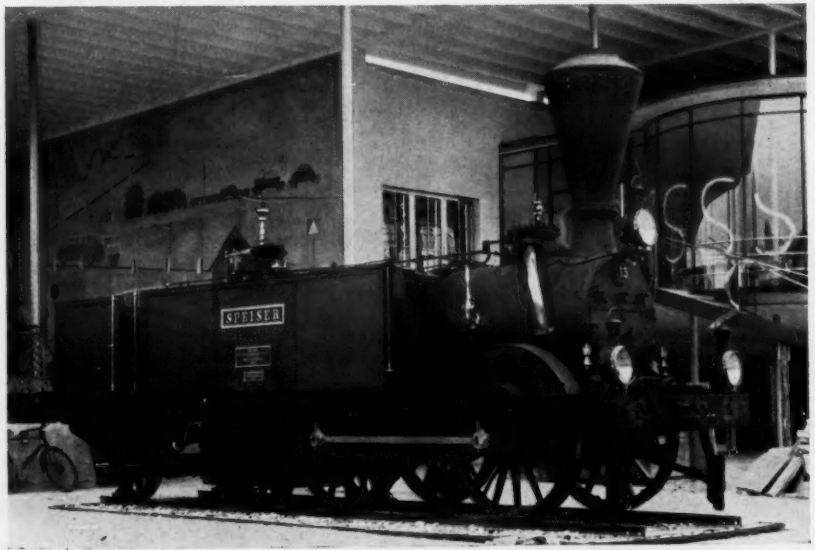
the barriers, and a new office constructed in teak to match the other erections. This has had the effect of allowing for an improved entrance. Included in the new building scheme for the parcels department is an improved entrance for the local station.

Side issues connected with some of the improvements include the closing, at the end of February, 1937, of the hotel long bar on No. 10 platform, and the transfer of two displaced kiosks to Liverpool Street for service at that station. In addition to the various improvements mentioned, the lighting and indicator arrangements have been modernised, and automatic machines grouped.

Departure platform barriers, with time of the Queen of Scots Pullman indicated on No. 10. Excursion and other special notices are posted on the boards seen between platform entrances



Above : (left) High-speed electric railcar with electric kitchen and bar, standing at a reproduction of a standard station platform equipped with Gfeller light signals ; and (right) Glazed roof observation car, Brünig metre-gauge section

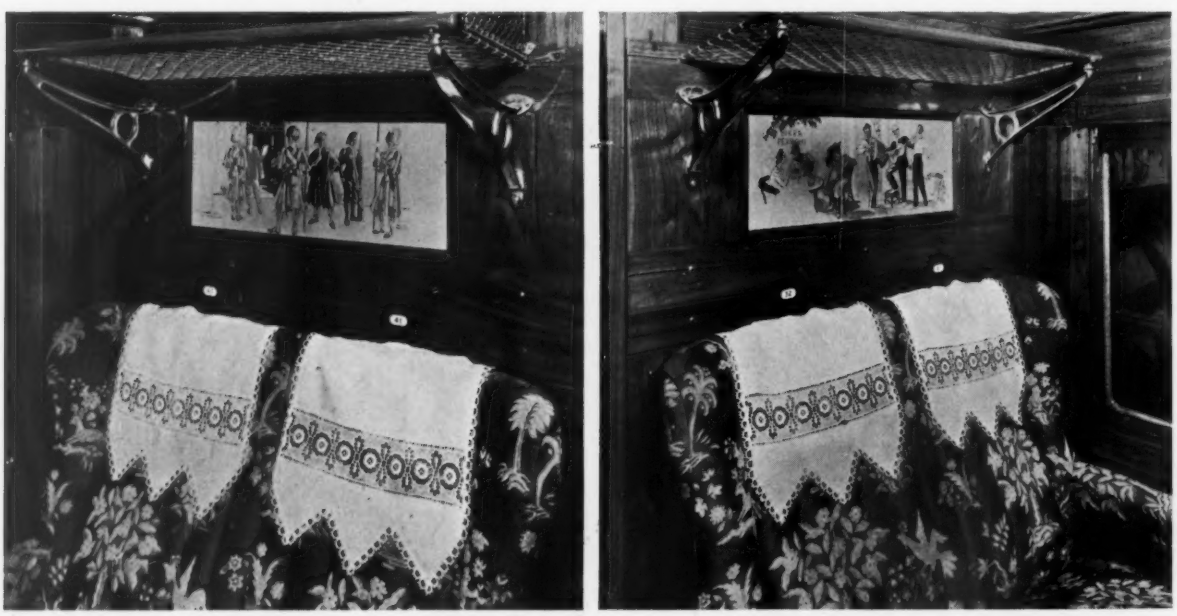


L. Beringer] *(Left and right) views of aerial cableway, a special feature of the exhibition ; (centre) The oldest existing Swiss locomotive, built* 1857 [L. Beringer

FEDERAL RAILWAYS EXHIBITS AT THE SWISS NATIONAL EXHIBITION (*See page* 933)

"Italian" Coach in Southern Railway Boat Train

General view of interior of Southern Railway coach specially decorated and furnished for boat train service (see our issue of March 31)



Italian scenes from sketches made on the spot by Miss Helen McKie replace the usual views in this carriage. They are drawn on tinted paper harmonising with the panels and upholstery

RAILWAY NEWS SECTION

PERSONAL

From *The London Gazette* of June 6: Territorial Army, Royal Engineers, Engineer & Railway Staff Corps: Colonel the Lord Stamp, G.C.B., G.B.E., D.Sc., to command the unit (March 3).

Regular Army Supplementary Reserve of Officers, Corps of Royal Engineers, Transportation: The following to be Second Lieutenants (June 7): J. W. Richardson, E. R. Gooding, P. G. Coates (late Cadet Corpl., Derby Sch. Contgt., O.T.C.).

L.M.S.R. Appointments

The following appointments have been approved by the directors:—

Mr. J. S. Elliott, Assistant, Office of Divisional Superintendent of Operation (Motive Power), Crewe, to be District Locomotive Superintendent, Leeds.

Mr. W. Handy, Light and Power Assistant, C.M.E. & E.E. Department, Euston, to be Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Euston.

Mr. R. C. Archbutt, Divisional Outdoor Machinery Assistant, C.M.E. & E.E. Department, Derby, to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Derby.

Mr. W. M. Chambers, Resident Engineer, C.M.E. & E.E. Department, Garston, to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Manchester.

Mr. R. M. Robertson, District Inspector, C.M.E. & E.E. Department, Barrow, to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Barrow.

Mr. F. G. Umpleby, Divisional Outdoor Machinery Assistant, C.M.E. & E.E. Department, Crewe, to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, London.

Mr. D. H. Binyon, District Inspector, C.M.E. & E.E. Department, London, to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Leeds.

Mr. R. G. Hullah, Technical Assistant, C.M.E. & E.E. Department, Euston, to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Birmingham.

Mr. R. Russell, Inspector, C.M.E. & E.E. Department, Manchester, to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Liverpool.

Mr. W. Marshall, Assistant to Engineer, Belfast (N.C.C.), to be District Assistant (Outdoor Machinery Services), C.M.E. & E.E. Department, Crewe.

Mr. J. L. Plumbe, District Inspector, C.M.E. & E.E. Department, Mirfield, to be Resident Engineer, C.M.E. & E.E. Department, Garston.

Mr. P. G. Deeping, District Foreman, C.M.E. & E.E. (C. & W.) Department, Bletchley, to be District Foreman, C.M.E. & E.E. (C. & W.) Department, Dewsbury.

Mr. C. F. White, M.I.Loco.E., Chief Mechanical Engineer, Great Indian Peninsula Railway, has been granted 18 months leave preparatory to retirement as from May 13, 1939. He served an apprenticeship at the Hyde Park Locomotive Works of the North British Locomotive Company, Glasgow, from February, 1903, to June, 1907, and then joined the North Eastern Railway as a pupil of the Chief Mechanical Engineer, Mr. Wilson Worsdell. In September, 1908, he was appointed to the North Western Railway of India as an Assistant Carriage & Wagon Superintendent, and was stationed at Lahore. In 1912 he gained District Rank, and took charge of the Rawalpindi District and Workshops; from then until 1919 he had charge of the Pindi, Lahore, Saharanpur, and Karachi Districts respectively. In 1919 he resigned from the Superior Revenue Establishment of the Indian State Railways and joined B. R. Herman & Co. as Engineering Manager at Karachi. Six years later he joined the G.I.P.R. as an Assistant Works Manager in the Mechanical Department, was promoted to Works Manager on October 6, 1932, and held charge of the Locomotive Workshops at Parel and Carriage & Wagon Workshops at Matunga and Jhansi from time to time. Promoted to be Deputy Chief Mechanical Engineer in September, 1937, Mr. White was appointed to officiate as Chief Mechanical Engineer in November, 1937, and he held that post up to the time of his leave prior to retirement.

On May 1, Mr. J. A. Ellis, Commissioner of Railways for Western Australia, began six months' leave of absence, and left Western Australia with his wife and daughter on a long visit to England and Europe. He intends to travel extensively both in England and on the Continent, and will take the opportunity of acquainting himself with recent developments in railway matters overseas. During his absence the department will be administered by Mr. J. F. Tomlinson as Deputy Commissioner. Mr. Tomlinson, who is at present Secretary for Railways and Assistant to the Commissioner, will be relieved during this period by Mr. C. Reymond, Finance Officer of the Secretary's Branch of the administration.

The Queen on the footplate of the C.P.R. locomotive on which Their Majesties rode for thirteen miles during their journey across Canada

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British Standards Institution

At a meeting of the General Council of the British Standards Institution on May 9, Sir Frank Heath, G.B.E., K.C.B., resigned the chairmanship and Sir Percy Ashley K.B.E., C.B., formerly Secretary and now a member of the Import Duties Advisory Committee was unanimously elected as Chairman for the ensuing year. Sir Percy Ashley assumes office from the date of the annual general meeting, which will be held at the Dorchester Hotel, Park Lane, W.1, on June 15 at 11.15 a.m. The meeting will be

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Mr. M. A. Henry

Appointed Divisional Engineer, Neath, Great Western Railway

followed by a luncheon at which the Rt. Hon. R. S. Hudson, M.P., Secretary of the Department of Overseas Trade will be the chief guest.

Mr. M. A. Henry, A.M.Inst.C.E., who, as recorded in our issue of June 2, has been appointed Divisional Engineer, Neath, G.W.R., in succession to Mr. J. E. S. Griffith, was educated at Whithorn School, and George Watson's College, Edinburgh. He served his pupilage with the firm of Belfrage & Carfrae, civil engineers, Edinburgh, and in 1912 joined the service of the Caledonian Railway as an Engineering Assistant. In 1915 he joined the Forces as an Officer in the Royal Engineers. In March, 1919, Mr. Henry was appointed Secretary and Construction Officer of the Allied (later British) Railway Mission to Poland, with headquarters in Warsaw. He returned to the Caledonian Railway in 1921, and in 1923 joined the Great Western Railway Company's service in the New Works Department at Paddington. In September, 1924, he became Assistant Resident Engineer at Newport, and was appointed Resident Engineer there in January, 1926. He also supervised large constructional works at Cardiff. In October, 1927, Mr. Henry was appointed Assistant Divisional Engineer, Taunton, and in May, 1931, he was transferred to Neath in a similar capacity. In 1937 he returned to the New Works Department at Paddington prior to his appointment as Resident Engineer on a section of the North Acton to Ruislip electrification scheme, from which duties he is now transferred to Neath.

Mr. Thomas Hagley retired at the end of May from the position of Stationmaster, Frizinghall and Manningham stations, L.M.S.R., after 45 years' service with the company. He began his railway career with the former Midland Company at Hellifield, where his father had been a guard for 51 years.

PRESENTATIONS TO MR. J. B. STEPHENS AND SIR RALPH WEDGWOOD

At an informal meeting held at Euston Hotel on June 5, Mr. J. B. Stephens, Deputy Chairman of the Great Northern (Ireland) Railway, who retired from the position of General Manager on January 31 last, was the recipient of a silver stop watch, suitably inscribed, from his former colleagues of the General Managers' Conference.

On the same day an informal luncheon was held at which Sir Ralph Wedgwood, C.B., C.M.G., who retired from the position of Chief General Manager of the L.N.E.R. on March 31, was presented with two Georgian silver dishes, one of which was engraved with facsimile signatures by his former colleagues of the General Managers' Conference and the London Passenger Transport Board. Those present at the gathering included Lord Ashfield, Lord Stamp, Sir J. Milne, Sir W. V. Wood, Mr. C. H. Newton, Mr. F. Pick, Mr. J. B. Stephens, and Mr. G. Szlumper.

PRESENTATION TO MR. E. E. PAINTER

At the conclusion of the meeting of the railway companies' general managers at the Railway Clearing House on June 6, Mr. E. E. Painter, who recently relinquished the position of Secretary to the Railway Clearing House, was presented with a silver and gold cigarette case bearing the facsimile signatures of the respective general managers; the presentation was made by the Chairman, Sir James Milne. Mr. Painter has been the recipient of several other tokens of appreciation from railway officers and also from the staff of the Railway Clearing House.

Mr. S. A. Blackall

Divisional Engineer, Newport, G.W.R., 1931-39

Mr. S. A. Blackall, who will retire at the end of June from the position of Divisional Engineer, Newport, G.W.R., was appointed a surveyor and draughtsman on the staff of the Chief Engineer at Paddington in 1896. He assisted the Resident Engineer on the construction of the Stert & Westbury

Inaugural "Empire Special" train to Southampton for flying boat passengers leaving the private station of Imperial Airways at Victoria last Tuesday (*see paragraph on page 943*)

Railway, Castle Cary & Langport Railway, and Cheltenham & Honeybourne Railway. He acted as Deputy Resident Engineer on the Aynho section of the Ashendon & Aynho Railway and, on the completion of this work, was appointed in 1911 to be Resident Engineer at Swansea, where he supervised the construction of the following works: Portion of the Swansea district lines, Neath Loop, Swansea hump yard, and part of the Clydach, Pontardawe & Cwmgorse Railway. In 1922 Mr. Blackall was transferred to the Divisional Engineer's Office at Neath as Chief Assistant, and became Assistant Divisional Engineer in 1924; he was appointed Divisional Engineer for the Central Wales Division in 1926. In 1931 Mr. Blackall was appointed Divisional Engineer at Newport. He will be succeeded at Newport by Mr. R. F. Wilson, as announced in our June 2 issue.

We are asked to announce that the date fixed for this year's Dick, Kerr reunion dinner is Friday, June 16, 7.30 p.m., for 8 o'clock, at the Holborn Restaurant, London, W.C.2. Those intending to be present should advise Mr. R. Briggs, 36, Kingsway, W.C.2, not later than June 14.

Memorial to Sir Eric Geddes

A plaque to the memory of Sir Eric Geddes, Chairman of the Dunlop Rubber Co. Ltd. from 1922 to 1937, was unveiled at Fort Dunlop on Wednesday afternoon by Sir George Beharrell, present Chairman of the company. The plaque is the gift of the Fort Dunlop employees, representatives of whom were on the platform at the unveiling ceremony. Sir Eric Geddes was the first Minister of Transport, and died on June 22, 1937.

In the inscription underneath the photograph of the group of visitors in the lounge car at the recent inspection of the new Union Limited and Union Express Trains for South Africa at the Metropolitan-Cammell Carriage & Wagon Company's Saltley works, on page 916 of last week's issue, we regret that there was an error. Mr. C. E. Dee was referred to as a partner in Messrs. Livesey & Henderson, whereas he should have been described as Carriage & Wagon Department, Messrs. Livesey & Henderson.

Mr. E. E. Hopper, Chief Staff Clerk, London City Manager's Office, L.N.E.R., retired from the service on June 3. He joined the former Great Eastern Railway in 1892 and passed through various sections of the District Goods Manager's Office at Hamilton House. On March 1, 1926, he was appointed Chief Staff Clerk at the Suburban District Goods Manager's Office, King's Cross, and was transferred to the City Manager's Office in a similar capacity in November, 1933. Mr. Hopper is leaving London for St. Ives, Cornwall, and chose a greenhouse as a parting gift from his colleagues, who wished to give a token of their high esteem and affection. A wallet of notes for the purchase of this was presented by Mr. Percy Syder, London City Manager, together with a fountain pen for Mrs. Hopper, at a well-attended gathering in the City Manager's Office on June 2. Mr. Syder referred to Mr. Hopper's 46½ years' service and thanked him for the great assistance he had rendered. Mr. A. G. Croxall, Assistant City Manager, Mr. Phillips, Chief Canvasser, and many others, including representatives of the station and receiving office agents, spoke of the good relations that had always existed between the Chief Staff Clerk and themselves.

Birthday Honours

K.C.M.G.

Mr. Edward Wilshaw, Chairman and Managing Director, Cables & Wireless Limited.

K.B.E.

Mr. Bernard Dudley Docker, Chairman, Birmingham Railway Carriage & Wagon Co. Ltd.

Mr. A. T. V. Robinson, C.B., C.B.E., Second Secretary, Ministry of Transport.

C.S.I.

Mr. A. E. Tylden Pattenson, Member (Traffic), Railway Department (Railway Board), Government of India.

C.I.E.

Mr. John Mackinnon, Chief Engineer, North-Western Railway, India.

C.B.E. (Civil Division)

Mr. J. S. Nicholl, Member of the Transport Advisory Council.

Mr. H. J. Russell, General Manager, Newfoundland Railway.

Mr. P. W. Weaver, M.B.E., formerly Traffic Manager, Egyptian State Railways.

O.B.E. (Military Division)

Lt.-Colonel and Bt.-Colonel Eric Gore-Browne, Deputy Chairman, Southern Railway.

O.B.E. (Civil Division)

Mr. G. A. Gahan, Railways Commissioner, Commonwealth of Australia.

Mr. A. Winter Gray, Secretary, Institute of Transport.

Mr. H. R. Rishworth, Principal Medical and Health Officer, Great Indian Peninsula Railway.

M.B.E. (Civil Division)

Mr. W. O. Browne, District Transportation Superintendent, Madras & Southern Mahratta Railway.

Mr. O. Gomes, District Traffic Superintendent, Rates, Bombay, Baroda & Central India Railway.

Mr. H. H. Hitchcock, Secretary of the Beit Railway Trust.

Indian Railway Staff Changes

The Hon. H. T. de B. Bingham, Senior Government Inspector of Railways, Bombay, has been granted 20½ months' leave preparatory to retirement, as from April 15.

Mr. J. C. O'Neill has been appointed to officiate as Senior Government Inspector of Railways, Bombay, as from April 15.

Mr. K. R. Rama Ayyar has been appointed to officiate as Deputy Chief Accounts Officer, E.B.R., as from April 12.

South Wales Docks Projects

As a result of a memorandum drawn up by a special committee appointed to inquire in the dry dock facilities at the South Wales ports a petition is to be presented to the Government for assistance towards the proposed construction of five dry docks and the modernisation of several others at the chief Bristol Channel ports.

The Committee, which recently completed its investigations, suggested that at Cardiff, Newport, Barry, and Port Talbot there was need for a large new dry dock and that at Swansea the existing dry docks should be widened, and that a new entrance should be provided to the docks.

Proposals to the Government include :—Barry.—Construction of a large dry dock and the modernisation of the Commercial Dry Dock to take the biggest vessels normally trading or expected at the port in war time. Cardiff.—Completion of the partially constructed dry dock. Newport.—A new dry dock on a site already planned ; conversion of the old Eastern Loch entrance into a dry dock and improvements to the Commercial, Bailey's, and Tredegar dry docks. Swansea.—Extension to the present dry dock and another entrance. Port Talbot.—Enlargement of the present dry dock, or the construction of a new one. Pembroke.—Repairs to the existing dry dock and slipways. Milford.—Modernisation of the present dry dock and construction of a new dry dock at Milford.

The memorandum prepared by the Committee states that the dry docks at the various ports should be improved and widened to accommodate the new bigger beam type of ships now favoured.

The Committee representing the Bristol Channel ports and Welsh M.Ps. points out that the lack of docking facilities is a handicap to the ship-repairing industry. The enlargement of a number of dry docks was of national importance if disorganisation of shipping in war time was to be minimised.

There were only nine dry docks in the Bristol Channel able to hold vessels of 60 ft. beam and of these five were tidal and subject to neap tides, while only three could accommodate 70-ft. beam vessels.

The dry docks at Cardiff, Barry, and Newport could hold, in 1913, 45 vessels of the average type trading to these ports. Today they only had 22 workable berths of which only seven would take ships of 58-ft. beam.

XUM

Ancillary Businesses of the British Railways, 1938

VI.—Air Transport

Since 1934, in which year the company known as Railway Air Services Limited was formed, the G.W.R., L.M.S.R., and Southern Railway have taken an active and important part in the development of the internal air services of Great Britain. The early stages of such an undertaking must almost inevitably result in financial loss, as experience alone can determine the commercial possibilities of internal air travel and the place it is likely to occupy in a co-ordinated system of transport. It is not unusual for such experience to be bought dearly, and the three railways concerned have certainly been called upon to bear fairly substantial losses in connection with their experiments in the provision of air transport facilities. Very valuable experience has been obtained, however, and many extremely useful services have been introduced. The losses incurred on air transport during the last two years are shown in the following table :—

Company	Gross receipts		Expenditure		Deficit	
	1938	1937	1938	1937	1938	1937
	£	£	£	£	£	£
G.W.R.	905	2,169	4,814	11,999	3,909	9,830
L.M.S.R. ..	19,390	28,121	52,902	64,656	33,512	36,535
S.R.	1,389	2,210	6,364	7,313	4,975	5,103

Gross receipts of the three companies were £11,816 less than in 1937, but expenditure fell by £19,888, with the result that the total deficit of £42,396 was £8,072 less than that of the previous year.

Improved Facilities

Various improvements were effected last year in the services provided by Railway Air Services and its associates. A direct air service between London and Glasgow *via* Liverpool was inaugurated on May 2, 1938, with a scheduled time of 3 hr. 15 min. southbound and 3 hr. 20 min. northbound. This service was in addition to the Royal Mail London-Glasgow route *via* Belfast. A connection at Glasgow with Scottish Airways Limited enabled passengers from Croydon to reach Lerwick, in the Shetlands, in one day, the actual flying time being 8¼ hours (*via* Belfast and Glasgow). This improvement was made possible by Scottish Airways Limited taking over the previously independent air lines in the north of Scotland and extending them southwards from Inverness, through Perth, to Glasgow. The Liverpool-Shoreham route was extended to Manchester, and a new service was introduced between Cardiff and Ryde (with connection for Shoreham) on Sundays between June 26 and September 11. Accelerations were effected in point-to-point flying times on the Bristol - Cardiff - Exeter - Plymouth route.

The London-Belfast-Glasgow service, now in its fifth year of continuous operation, was in popular demand and maintained its reputation for reliability. Referring to this service at the last annual general meeting of the L.M.S.R., Lord Stamp, Chairman of the company, stated that approximately 470,000 aircraft-miles were operated in 1938, and the overall regularity was more than 98 per cent. In the same period, the service carried 7,000 passengers and 540,000 lb. of mails and freight, and the traffic is steadily increasing. This year Manchester has been brought on to the direct route from London, and increased services provided between London, Manchester, and Liverpool. Another popular facility is that provided by the Isle of Man Air Services. This company was formed in 1937 to take over the interests in air transport to the Isle of Man of the L.M.S.R., the Isle of Man Steam Packet Company, and the Blackpool & West Coast Air Services Limited. In its first year of operation, more than 600,000 aircraft-miles were flown without mishap, over 20,000 passengers and 500,000 lb. of mails and freight having been conveyed.

Unification

Last year was notable for the formation of several new air companies, which have taken over the services previously operated by independent groups, thus tending towards the merging of interests and co-ordination of services recommended by the Maybury Committee. In Scotland, two new companies—Scottish Airways Limited and Western Isles Airways Limited—were formed by the L.M.S.R., David MacBrayne Limited, and British Airways Limited. Scottish Airways Limited is responsible for the services previously operated by Northern & Scottish Airways Limited and Highland Airways Limited, while Western Isles Airways Limited was formed to operate the former Northern & Scottish services from Glasgow to the Hebrides and the Western Isles.

A further important step towards co-ordination was the formation of a new company, known as Great Western & Southern Air Lines, which now operates the services previously operated on behalf of the G.W.R. and Southern Railway by Railway Air Services Limited between Manchester and Brighton *via* Liverpool, Birmingham, Bristol, Southampton, and the Isle of Wight; Bristol-Cardiff-Plymouth; and Cardiff-Brighton *via* Bristol, Southampton, and the Isle of Wight; together with the services previously maintained by Channel Air Ferries Limited between Heston and Bembridge; Shoreham and Cardiff; and Plymouth, Land's End, and the Scilly Islands. The merging of these interests had the immediate advantage of providing improved facilities between Brighton and the Scilly Islands. At the same time, Jersey Airways began a service between Southampton and Dinard, connecting at Southampton with the Cardiff-Brighton service, thus making it possible to fly from Manchester to Dinard in approximately 5 hours. Incidentally, Jersey Airways inaugurated an early-morning newspaper service from Southampton to Jersey in October last, two machines leaving Southampton at 6.0 a.m. daily conveying between them 2 tons of papers.

Licensing Air Service

Regulations for licensing internal air lines in Great Britain under the Air Navigation (Licensing of Public Transport) Order, 1938, came into operation on September 16, 1938. These regulations require licensees to make monthly returns of their activities to the licensing authority, and further provide for the publication of applications for licences in order to give an opportunity for the making of representations regarding them. Hearings began on December 13 last, by which time seventy applications for full licences to operate internal air services had been received by the Air Transport Licensing Authority.

As a result of a Government decision, based on the recommendation of the Cadman Committee, eleven air companies operating internal services in Great Britain have entered into agreements with the Air Ministry to share in an annual subsidy not exceeding £100,000, payable for five years. The companies concerned include Railway Air Services Limited, Isle of Man Air Services Limited, Jersey Airways Limited, and other companies in which the railways are interested. The subsidy is at the rate of 6d. a ton-mile in the first year, falling by ½d. a year to 4d. in the fifth year, unless the introduction of new types of aircraft should lead the Air Ministry to maintain the rate at 6d. British aircraft, equipment, and staff are required to be employed, and it is also laid down that a suitable proportion of the employees shall be present or past members of the Air Force Reserve or the Auxiliary Air Force.

Forthcoming Events

June 14-17.—Institute of Transport, at Southampton. Annual Congress.

June 17 (*Sat.*).—Permanent Way Institution (Manchester-Liverpool), at Manchester Ship Canal Company, Trafford Road, Salford, 2.45 p.m. Excursion on Ship Canal to Barton Aqueduct.

QUESTIONS IN PARLIAMENT

Downham Market Railway Accident

Mr. Herbert Morrison (Hackney, S.—Lab.), on June 5, asked the Minister of Transport whether he could give the House any further information regarding the railway accident at Downham Market last week.

Captain Euan Wallace (Minister of Transport): The House will already be aware, from reports in the Press, that this accident, which resulted in the death of four passengers, was caused by a collision between an express passenger train and a lorry at an occupation crossing. I know I am speaking for the whole House in expressing deep sympathy with all those affected by the accident. The Chief Inspecting Officer of Railways, who visited the spot a few hours after the accident, has been appointed to hold an inquiry on Thursday next.

Mr. Morrison: Has the Minister's attention been called to a statement made on behalf of the Company that they repudiate all liability in connection with the accident, and does he consider it right that that repudiation should precede the inquiry that is to be conducted?

Captain Wallace: The right honourable gentleman will know that on this question of compensation the railway companies are liable under common law for injury, &c., and any statement made by the railway company disclaiming liability at this stage has no validity. The liability will have to be determined by common law.

Mr. A. M. Lyons (East Leicester—C.): Do we understand that the officer who is conducting the inquiry is an employee of the company which has already repudiated liability?

Captain Wallace: Most emphatically no; he is an officer of the Ministry of Transport.

Mr. Campbell Stephen (Glasgow, Camlachie—I.L.P.): Is it the case that the repudiation by the railway company is because of the short-period tickets?

Captain Wallace: I must be excused from making any further statement. We are holding an inquiry, and I do not think I should say anything to prejudice that inquiry.

Mr. Stephen: Will the Minister look into the position with regard to the short-term tickets, and if necessary will he introduce legislation to deal with the disadvantages of them?

Captain Wallace: I am fully aware of the position in regard to short-term tickets, but it does not actually arise here. I will certainly look into it.

New Scale of Fares

Sir Percy Harris (Bethnal Green, S.W.—Lib.), on June 7, asked the Minister of Transport whether he had approved the new scale of fares fixed by the London Passenger Transport Board; and whether he proposed to do anything to protect the London travelling public from the increases, which in many cases would cause very serious hardships.

Capt. Euan Wallace (Minister of Transport): Under Section 29 of the London Passenger Transport Act, 1933, statutory jurisdiction over the fares charged by the London Passenger Transport Board resides in the Railway Rates Tribunal who have power, on the application of a local authority, or (in any case where the board have not themselves power to make the alteration in fares which they desire to make) on the application of the board, to revise the fares or any of them charged or chargeable by the board or modify any conditions applicable to such fares. The hon. Baronet will see that in these circumstances I have no power to intervene.

STAFF AND LABOUR MATTERS

International Labour Conference

The twenty-fifth session of the International Labour Conference opened at Geneva on June 8, and apart from other subjects there were six items on the agenda for second discussion and final decision as to the adoption of draft conventions or recommendations. These items are technical and vocational education and apprenticeship; regulation of contracts of employment of idigenous workers; recruitment, placing and conditions of labour (equality of treatment) of migrant workers; regulation of hours of work and rest periods of provisional drivers (and their assistants) of vehicles engaged in road transport; generalisation of the reduction of hours of work in industry, commerce and offices; a reduction of hours of work in coal mines.

The British Government delegates attending the conference are Mr. F. W. Leggett, Under-Secretary, Ministry of Labour, and Mr. E. G. Savage, Senior Chief Inspector, Board of Education, with twelve technical officers. The British employers' delegate is Sir John Forbes Watson, Director, National Confederation of Employers' Organisations, with seven technical officers. The British workers' delegate is Mr. J. Hallsworth, Industrial General Secretary, National Union of Distributive and Allied Workers, also Chairman of the Trades Union Congress General Council, with eight technical officers.

N.U.R. Annual Report

The assets of the National Union of Railwaymen at the end of 1938 reached the record figure of £2,391,386, an increase during the year of £175,281.

Mr. J. Marchbank (General Secretary), giving these figures in his annual report, published in the *Railway Review* last week, states that the increase was also the highest in the union's history "a record of which we may be justly proud." The total income of the union during 1938 was £674,935, an increase on the 1937 figures of £39,882. Interest on investments accounted for £101,644, an increase over the previous year of £20,000. "This may be regarded as very satisfactory," states Mr. Marchbank, "when it is borne in mind that the rate of interest maintains an average of over 4 per cent. and having regard to the fact that interest rates have shown a downward tendency during recent years."

Among the benefits paid out by the union during the year the following are mentioned:—

	£
Out of work pay	25,087
Disablement grants	67,062
Death benefit...	10,714
Accident benefit	22,759
Orphan fund	32,074
Sickness benefit	13,665

The aggregate total of members' weekly contributions received at head office amounted to £283,634 as against £267,511 the previous year, an increase of £16,123. The general fund balance was £601,148, an increase on the previous year of £139,801. "This is especially encouraging when one recollects that the union's weekly contribution is the lowest in the country," comments Mr. Marchbank. The membership at the end of 1938 was 366,659.

T. & G.W.U. Annual Report

The annual report of the Transport & General Workers' Union for 1938 shows that the income of the union for the year was £1,016,072 of which £941,633 represented contribution income. "This," states the executive of the union, "is the highest income received by the union in any single year." The cash benefits paid out during the year total £204,678 11s. 11d. The following table shows the distribution:—

	£	s.	d.
Dispute	22,703	5	0
Accident	26,640	7	5
Sickness	49,733	10	6
Funeral	37,578	0	4
Superannuation ...	12,531	19	1
Disablement	50	0	0
Distress	7,526	7	10
Legal	12,820	13	10
Medical fees and reports	1,374	1	2
Unemployment ...	13	19	2
Insurance	254	0	0
Shipwreck	32	4	0
Quarterage returned...	18,764	8	9
Convalescent Home ...	14,533	11	6
Women's Guild ...	122	3	4
	£204,678	11	11

The report states that since 1937 the executive has placed to the general fund reserve the sum of £346,876 3*s.* 3½d. On December 31 last the funds were:—

	£	s.	d.
General Fund ...	1,163,951	9	5½
Other funds	130,257	8	3
	£1,294,208	17	8½

The union, which began in 1922 with an amalgamation of 14 unions, had grown by the end of 1938 to an amalgamation of 45 unions with a total membership of 679,360.

XUM

MINISTRY OF TRANSPORT ACCIDENT REPORT

Aberdeen Joint (L.M.S.R. & L.N.E.R.) Station: October 7, 1938

At 5.0 p.m. the 2-6-2 "V2" class L.N.E.R. locomotive No. 4805 collided with a special passenger train as it was being backed on, 38 passengers suffering injuries, mostly of a minor nature. The accident was due to failure of vacuum brakes on engine and tender, and of the driver to retrieve the position in time. The weather was fine and the rail dry. Colonel A. C. Trench conducted the inquiry.

The engine had been turned out new from the Darlington shops on September 10, 1938, and run some 4,500 miles to the date of the accident. There are two vacuum cylinders on the engine and two on the tender, with a reservoir of 10·9 cu. ft.; all four cylinders having rubber rolling rings to seal the joint between piston and cylinder. There is a groove at the top of each piston into which the rolling ring should return at the bottom of the piston stroke, with brakes off. Displacement of the cylinders on the engine, for reasons of space, necessitates a link connection between one piston and the brake shaft lever. The upper portions of all four cylinders and the reservoir are interconnected by a maintaining pipe in communication with the ejector, serving to establish the vacuum, ball valves, as fitted on coaching stock, not being used. This enables vacuum to be well maintained during a long brake application. The flexible connection between engine and tender has ball valves, held out of action when the coupling is joined up. Should a serious leak occur from the lower to the upper side of any piston it will, *via* the maintaining pipe, render the brake equipment inoperative on both engine and tender.

After the accident a bad leak was found associated with one of the engine cylinders, while certain other defects were also present, including safety loops set too high, preventing brake pistons from falling the full stroke, piston rods badly scored, rolling rings twisted or awry, and piston rods working badly or bent. A brake pull rod was fractured, probably as a result of the impact, at a defective weld. All cylinders, pistons, piston rods and glands were within permissible tolerances. Generally speaking all rolling rings were soft and flexible, not perished or hardened.

Driver Chapman had worked the engine on its first trip north to Aberdeen three weeks earlier and found it satisfactory. He did not test the vacuum brake before leaving the Ferryhill shed, being satisfied everything was in order. Travelling tender first to his train, he found a full brake application at a signal produced no result and slowed the engine by going into forward gear. Continuing under a green hand signal (there being no fixed signal for the particular movement) he found another brake application ineffective. Eventually he again changed into forward gear, called to his fireman for the hand brake and applied steam, but the collision occurred. His fireman generally confirmed this evidence as did that of others.

Stationmaster Davidson noticed the engine steaming as it approached, as did a station foreman; Chapman told the stationmaster the engine was then in forward gear. Another driver had noticed the engine brake to be poor three days prior to the accident and had warned another not to risk too much with it. The latter confirmed receipt of the warning and said he had trouble also, but could find no defect or leak. He thought the rigging required adjustment and booked it for attention, but the fitter could find nothing wrong; he adjusted the engine equipment a trifle, however.

Inspecting Officer's Conclusions

The brake failure was a gradual one, developing for several days at least. Apart from the defective weld the only original defect of which there is definite evidence was the safety loop preventing one of the engine brake pistons falling the full stroke, the rolling ring not therefore returning into its groove in the piston top each time the brake was released. A similar limitation existed to a small degree in a tender cylinder. Leakage was found in the right-hand engine cylinder, fairly certainly due to rolling ring distortion, probably accentuated by the piston rod being so badly scored as to be almost immovable in its gland. A rolling ring badly awry would tend to force the piston rod askew, and although severe rod scoring is unlikely to have been so caused, at any rate in four weeks, similar cases are not unknown. Scoring due to some other cause would lead to jerky and irregular piston movement, more particularly downwards, accentuating any tendency for rings to twist. Either defect might lead to the other, with incremental effect in turn. Jerky motion of one cylinder would also be communicated to the other and might cause corresponding defects therein. Too tight a fit between piston and bush, or grit or other abrasive, might score the rods. The design does not require a tight fit. Cases have occurred in which the rubber neck rings have disintegrated, possibly owing to oil on the rod, and rubber fragments, with dust and grit, may form an abrasive. Every effort is made to prevent oil reaching the rods.

The equipment of engine No. 4805 passed all tests in the works. Prolonged investigation has failed to reveal the precise cause of piston rod scoring, but everything points to the incorrect safety loop, leading to non-return of a rolling ring, as the primary factor, probably supplemented by fortuitous oil and grit. Irregular and jerky movement through the rigid coupling doubtless transmitted the effects to the second cylinder. The bend in one of the rods was probably caused by the collision.

Chapman could have tested the brake by destroying vacuum after raising it and observing the vacuum chamber gauge, a commonsense test, easily carried out; though not specifically laid down, it is recognised as good practice. It is most unlikely that the tender pull rod was broken when the engine left the shed, but if it was tests showed the tender hand brake alone would have stopped the engine from 10-12 m.p.h. in the distance available after the signal check. Possibly, after the restoration to back gear, his regulator was not quite closed, accounting for the increase in speed, for there appears no reasonable doubt that the engine was steaming in reverse gear a short distance from the platform. Any assumptions are necessarily speculative, but, having once brought his engine under control as he did, Chapman could have proceeded thereafter at a low speed and must bear a considerable share of responsibility for the accident. He is much to be criticised for proceeding to the train, knowing his vacuum brake was seriously defective but intending to rely on the brake power of the coaches. No blame is attributed to his fireman or to the fitter; the latter had no reason to suppose there was any defect in the vacuum system. Neither would it be fair to blame the other two drivers, but it is for consideration whether any suspected defect in the vacuum system should be specifically mentioned in booking repairs for attention, thus ensuring that the fitter shall test the system, apart from making brake rigging adjustments.

Recommendations and Remarks

Obviously safety loops should not restrict brake cylinder piston stroke and steps have been taken to deal with this. Some hold that the first fraction of upward stroke should, if possible, be against negligible load, to ensure the rolling ring leaving its groove uniformly. Slotting of the brake lever arm allows $\frac{1}{2}$-in. free movement to the piston rod, but to attain this on both cylinders and allow full stroke on both needs accuracy in location and dimensions of the safety loop. Alternatively it is argued that the inevitable slack in the brake gear suffices for this, the loop being merely mounted clear of the arms in their lowest positions. No opinion is expressed on the merits of these alternatives, but the matter requires careful

consideration and issue of erection instructions accordingly.

An important factor contributing to the failure appears to have been the rigid coupling of both piston rods to a common brake lever shaft. In new construction this has been modified and either piston can operate the shaft, even if the other cannot move. The leakage in one cylinder led to failure of all four. Non-return valves in the maintaining pipe circuit, similar to coaching stock ball valves, would avoid such extension of a failure. If there are difficulties in isolating each of the four cylinders, isolation of those on the engine from those on the tender would maintain substantial brake power in the event of a bad leak in any one cylinder.

It is also for consideration whether instructions should, if not already in existence, be issued as to check of the gauge reading of the chamber side vacuum before an engine leaves the shed.

Aluminium in Engineering and Architecture

The new 5,000-ton extrusion press which recently began operation at the Banbury works of the Northern Aluminium Co. Ltd., and from which are made the largest extrusions yet produced, is one of the biggest of its type in the world. It is capable of extruding billets for forgings or other purposes to a maximum weight of nearly half a ton, and of maximum cross section diameter about 16 inches. For the construction of aircraft, railway coaches, overhead cranes, or crane jibs, and similar structures, it is now possible to produce special shapes, angles, and channels of suitable cross-section up to 70 ft. long in heat-treated high-strength alloys.

In architecture the plant makes possible the production of decorative mouldings for covering building piers or columns in sections up to 12 in. maximum dimension. Such mouldings, besides obviating joints, may be produced in medium-strength alloys to strengthen the structure. For the more intricate sections in pure aluminium and common alloys which might be required for architectural purposes, finished pieces weighing over 600 lb. each may be produced in dimensions which fall within a 12-in. diameter circle; in the common alloys the cross-sectional area may be as great as 50 sq. in., and in the strong alloys approximately 14 sq. in. Where such large diameters are concerned the thickness of section is a ruling consideration, and it is not possible to produce anything thinner than about three-eighths of an inch when the overall dimensions are up to the limit of 12 inches. On the other hand, smaller diameters enable thinner scantlings to be produced and the maximum weight per piece extruded reduced.

Danish Train Service Developments

Changes in the method of working the Danish Lyntog diesel-operated high-speed trains across the Little Belt came into operation with the 1939-1940 timetables on May 15, and the new diesel ferry steamer *Storebaelt*, together with accelerations in running of the trains concerned, have made possible some substantial accelerations. Hitherto three of these trains—Kronjyden for Aarhus and Frederikshavn, Østjyden for Aarhus and Struer, and Vesterhavet for Esbjerg and Ringkøbing—have crossed from Korsør to Nyborg on the same ferry, and as Kronjyden has been the last on to the ferry and the first off it, Østjyden has been delayed 14 min. and Vesterhavet (the first on and the last off) 28 min. in order to secure a 7-min. running margin between each service. Østjyden now leaves Copenhagen 15 min. earlier, and has its own independent ferry, thus gaining 14 min. at the ferry terminals, as well as 21 min. in running—a total acceleration of 35 min. Further, by running in advance, of Kronjyden to Aarhus, and making various intermediate stops, Østjyden now acts as a feeder to Kronjyden, which, as previously, runs non-stop over the 123·1 miles from the ferry terminal at Nyborg to Aarhus in 126 min.; thus the service from the island of Fyn and from Fredericia to North Jutland has been improved. Vesterhavet still shares a ferry with Kronjyden, and is speeded up 22 min. in all.

Altogether the six Danish Lyntog (those already mentioned, with Midtjyden, Englaenderen, and Nordjyden) make 26 daily runs at over 58 m.p.h. from start-to-stop, with a total mileage of 1,257, of which 16 runs (709 miles) are over 60 m.p.h. The fastest is the run of Østjyden from Roskilde to Slagelse, 38·3 miles in 35 min., at 65·7 m.p.h. As a result of various additional railcar services (such as diesel-electric motor-coaches of class "MO" on the Aarhus—Grenaa line), for the first time on record daily railcar passenger train-mileage over the Danish State Railways exceeds that of steam-hauled trains. On most of the private lines this change-over took place some years ago. Careful investigation has also been made into wagon movements between the islands of Zealand and Falster, on the one hand, and the island of Fyn and the mainland of Jutland, on the other, separated by the Great Belt ferry, and as a result considerable expedition of traffic has taken place, amounting to as much as 24 hr. between Copenhagen and the north of Jutland. Further acceleration is probable when the compressed air brake comes into general use on freight trains in Denmark.

Moral Rearmament

The campaign for Moral Rearmament was launched a year ago in East Ham Town Hall on the 60th birthday of Dr. Frank Buchman, the leader of the Oxford Group. Since then the movement has made rapid progress and national leaders in many countries, including the President of the United States, have welcomed Moral Rearmament as one of the most urgent needs of the world today. To mark the first anniversary of "M.R.A." a public meeting, at which International Leaders of the Group were present, was held at the Town Hall, East Ham, on Sunday last. This meeting was the counterpart of others held at the same time in Edinburgh, Liverpool, and Washington, U.S.A., where a National Assembly was sponsored by five members of the United States Cabinet.

After speakers from many different countries had told a most encouraging story of the world's response to the programme of Moral Rearmament as the foundation of a just and lasting peace, Dr. Buchman spoke by radio-telephone from Washington. For nearly an hour he read out messages which had been received from all parts of the world. Two hundred British M.P.s stated: "Only if founded on moral and spiritual rearmament can democracy fulfil its promise to mankind, and perform its part in creating mutual understanding between nations and restoring peace to the world." From certain members of the House of Lords (including Lord Stamp) came the message: "Unity and peace, whether national or international, can grow only amongst men and nations who become spiritually equipped with faith and love." Delegates to the Socialist Party conference in Southport telegraphed: "To us, Moral Rearmament means both changed individual lives and a conception of society based on the principles underlying Christian teaching." A group of prominent British business men stated: "Realising that the true function of industry, commerce, and trade is to supply the material needs of mankind, we desire to see abolished economic warfare, to establish the standards of Moral Rearmament in commercial transactions, to restore confidence in the machinery of business, and thus to build on sure foundations a saner and a kindlier world."

Members of the French Universities and various leaders of the Balkan countries sent their expressions of good-will, and the Oxford Group leader also read a message from President Roosevelt, who stated that the programme for Moral Rearmament for the world could not fail to lessen the danger of armed conflict. Therefore, it had to receive support on a world-wide basis.

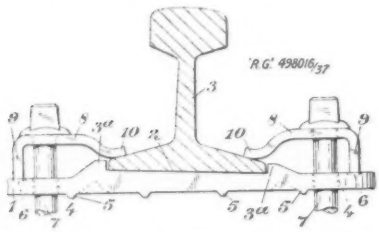
XUM

ABSTRACTS OF RECENT PATENTS*

No. 498,016. Securing Rails to Sleepers

Henry Williams Limited, of Railway Appliances Works, Darlington, and Owen Richard Williams, of Kitemore, Faringdon, Berkshire. (*Application date: July* 1, 1937.)

For use with wooden sleepers the bearing plate 1 is provided with a bed 2 for the reception of the base of a flanged rail 3. The plate is provided with three holes 4, one in one side of

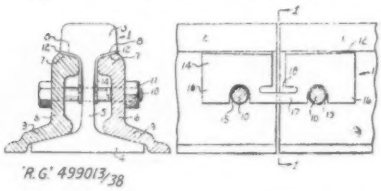


the plate on the transverse centre line and the other two on the other side, and on the outer side of the three holes with a short longitudinally extending recess, 6. The base of the plate is provided with ribs 5 or other projections to bite into the wooden sleeper. The plate is secured to the sleeper and the rail to the plate by means of three coach screws 7 in conjunction with three resilient steel clips 8 formed from a flat rectangular piece of steel and provided with a hole for the reception of a coach screw 7. Several modifications are described.—(*Accepted January* 2, 1939.)

No. 499,013. Wear Compensating Means for Rail Joints

Fred Stapley Wonham, of 277, *Park Avenue, New York, U.S.A.* (*Application date: July* 7, 1938.)

Metal shims 12 are provided between the surfaces 8 of the rail heads 3, and the surfaces 7 of bars 6, which connect the ends of adjacent rails 1,2. The body 14 of each shim is provided with

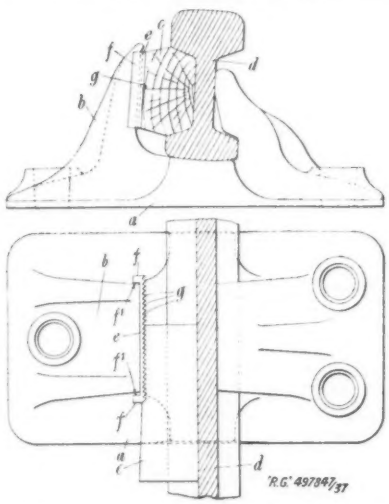


a T-shaped slot 18, and with arcuate notches 15 for receiving bolts 10 which wedge the bars 6 tightly against the head 3 and the base 4 of each rail. The provision of the body or apron 14 lessens the tendency of the shim to buckle. In a modification the T-shaped slot is dispensed with and each shim is formed in two equal parts by slotting along the line 1-1.—(*Accepted January* 17, 1939.)

No. 497,847. Railway Chair Key

Cecil Wilfred Whiteley, of 41, *Latimer Road, Wimbledon, London, S.W.*19, *and David Denis Williams, of Railway Appliances Works, Darlington.* (*Application date: June* 26, 1937.)

Inserted between the inner face of the jaw *b*, of a chair *a*, and the key *c*, is a flat plate *e* of rectangular formation provided with two end ribs *f* projecting backwards from the face of the plate. The inner face of the plate is provided with a series of parallel teeth *g* extending from the top to the bottom edges, these teeth being so cut

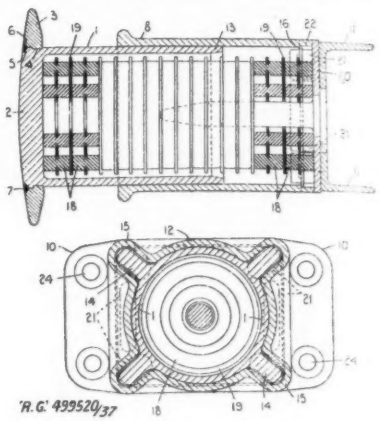


that one face of each tooth makes an angle of about 45 deg. and the other an angle of about 90 deg. with the face of the plate.—(*Accepted December* 28, 1938.)

No. 499,520. Buffers

Alec Stuart Davidson, of Heath Cottage, Reigate Road, Dorking. (*Application date: September* 20, 1937.)

A tubular plunger closed at its front end 2 to form the central portion of the buffer head, an annular flange 3 being pressed over the closed end 2, rides in a tubular front extension 8 of a buffer casing 9 having lateral flanges 10 secured to the vehicle headstock 11 by means of bolts 24, a part cylindrical intermediate portion 12 receiving and guiding a rearward extension 13 of the cylindrical plunger 1. The rearward extension 13 is formed with laterally projecting lugs 14 disposed diagonally of the buffer casing 9. The part-cylindrical portion 12 of the casing 9 is formed with pockets 15 which accom-

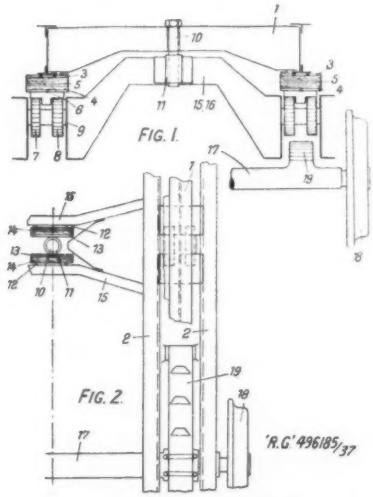


modate the lugs 14 serving as an outward limit stop for the operation of the pad or spring 16. Buffing springs 18 consisting of indiarubber units separated by metal plates 19, take the normal buffing thrusts, the supplementary spring 16 being compressed in parallel with the main spring 18 under heavy thrusts.—(*Accepted January* 25, 1939.)

No. 496,185. Mounting Railway Vehicle Bodies on Bogies

Getefo Gesellschaft Für Technischen Fortschritt m.b.H., of 13, *Woyrschstrasse, Berlin W.*35, *Germany.* (*Convention date: May* 5, 1937.)

Springings for vehicles running on rails are provided with a pivot device which is elastically supported in the



direction of travel but which is free to move on an elastic guide transverse to the direction of travel. In Figs. 1 and 2 the mounting of the wheel axle 17 with the wheel 18 and the leaf spring 19 sprung to the bogie frame 2 is diagrammatically shown. The carriage body transfers its weight with

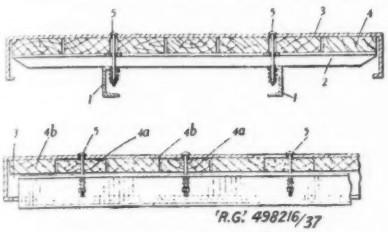
* These abridgments of recently published specifications are specially compiled for THE RAILWAY GAZETTE by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued, on payment of a subscription of 5s. a group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address price 1s. each

compression stress of the lateral rubber metal mountings 3, 4, and 5, to the rollers 7 and 8 of the bogie frame 2 while the forces in the direction of travel are really taken up by the supporting and guiding mountings, which consist of rubber members 14 bondedly arranged between two metal plates, 12, 13. This transference takes place *via* the pivot pin 10 which is tightly screwed to the vehicle body frame 1, or *via* the sliding sleeve 11.—(*Accepted November* 25, 1938.)

No. 498,216. Floors for Vehicles

Arnold Hüper, of Deula-Kraft, Berlin-Wartenberg, Germany. (*Application date: November* 13, 1937.)

Supporting boards 4 are loosely fitted between a metal floor 3 and transverse members 2, the floor being secured to

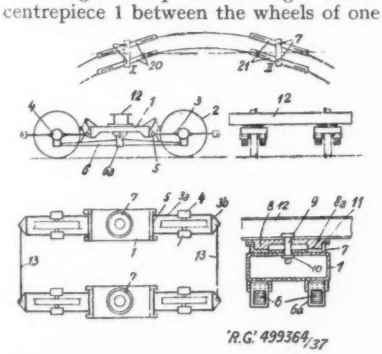


the transverse members and to longitudinal supporting members 1 by means of resilient and yielding devices 5, which may comprise spring-pressed bolts. In a modification, rattling of the boards is prevented by making the boards 4*b* somewhat thicker than the boards 4*a* through which the bolts 5 pass.—(*Accepted January* 4, 1939.)

No. 499,364. Bogies.

Schweizerische Locomotiv-und Maschinenfabrik, of Winterthur, Switzerland. (*Convention date: July* 13, 1937.)

A bogie comprises a bogie frame centrepiece 1 between the wheels of one

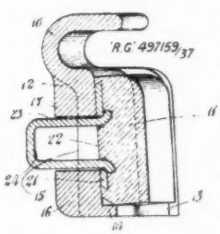


side of the whole bogie, a rocking-axle 5, this being mounted parallel to the wheel axle and serving to link a wheel carrier 3 to each side of the centrepiece. The U-shaped wheel carriers 3 hold the wheel 2 by means of the two shanks 3*a*, to which the axleboxes 4 are fixed, rigidly connected to the rocking axle 5. The shanks 3*a* are connected to each other rigidly at their ends by a cross-bar 3*b*. The ends of a laminated spring 6 are fixed at the axleboxes of the wheels on each side of the bogie, which springs are linked to the centrepiece 1 by means of the spring buckle 6*a*. The car body is supported by large flat supporting plates 7, in which the flat pivot 8 rests on a ringshaped surface 8*a*, on the centrepieces 1 by means of a main cross bar 12. A pin 9 with set collar 10 is placed in the centre. On the rim of the plate at 11 a dust-proof joint is fixed. The cross-bars 3*b* at the outer ends of the wheel carriers 3 at the two sides of the bogie are interlinked by gauge bars 13.—(*Accepted January* 23, 1939.)

No. 497,159. Brake Blocks

Ernest Telford Brook, of 62, *Ramillies Road, Bedford Park, London, W.*4, *and London Passenger Transport Board, of* 55, *Broadway, Westminster, London, S.W.*1. (*Application date : July* 9, 1937.)

As shown, the block is formed in two parts, a block proper 11 and a supporting shell 12, both the block 11 and the shell 12 being formed by moulding from cast iron. The shell 12 is of arcuate form and has two flanges 13 projecting from the concave face of the block 11 at each end of the latter. The flanges 13 are bridged



at one side by a ledge 14 formed integral with the shell 12. Centrally of the shell 12 there is left a rectangular opening 15 and the shell is thickened as indicated at 16 and 17 on both sides of this opening. Remote from the ledge 14 the shell 12 has an integrally curved lip 18 forming an open arcuate channel for receiving the flange of the vehicle wheel to form a rough guide for guiding the block horizontally. The brake block proper 11, also of arcuate form, is moulded on to a steel reinforcing plate 21 at its convex side. The plate 21 has a rectangular opening 22 in its central part through which extend the free ends of the limbs of a U-shaped stirrup member 23, the free ends of the limbs being bent outwardly over the inside of the plate 21 prior to the moulding of the block 11. The edges of the plate 21 are chamfered to afford a permanent connection with the block 11 which is removably locked in position by a wedge or other stirrup 23 between its base 24 and the convex side of the shell 12.—(*Accepted December* 14, 1938.)

COMPLETE SPECIFICATIONS ACCEPTED

495,896. Crompton, C. E. Shells for boilers and other cylindrical pressure vessels.

495,980. Tennant, W. J. (Motor Terminals, Inc.). Demountable freight containers.

496,185. Getefo Ges. für Technischen Fortschritt. Mounting of railway vehicle bodies on bogies.

496,303. Brush Electrical Engineering Co. Ltd., Hatton, H. W., and Hickman, W. Tramcars, railway vehicles, and the like.

496,364. Etablissements J. Marck Soc. Anon. Steam traps.

496,382. Kleimenoff, J. Refrigerating systems applicable to refrigerator cars.

496,426. American Steel Foundries. Knuckle couplers for railway and like vehicles.

496,488. Babcock & Wilcox Limited. Water-tube steam boilers.

496,495. Standard Telephones & Cables, Limited. Griffiths, J. B., and Brown, A. Railway signal and/or points control equipment.

496,582. Bez, C. Deposit blow-off valves.

496,590. Whyman, F., and Metropolitan-Vickers Electrical Co. Ltd. Control equipment for electric locomotives.

496,646. Waugh Equipment Company. Coupling and draught mechanism for railway vehicles.

496,768. Hodgkison, F. H. Boilers, steamers, and like hot-water containers.

496,891. Tennant, W. J. (Aktiebolaget Ljungströms Angturbin). Turbine-driven locomotives.

496,903. Turton, Platts & Co. Ltd., G., and Cowen, J. C. Keys for securing railway rails to rail chairs.

497,159. Brook, E. T., and London Passenger Transport Board. Brakes for vehicle wheels.

497,161. Cowper, D. G. Erskine-. Automatic swivelling mechanism for locomotive headlights.

497,216. Ratcliffe, J. T. Tipping vehicle, wagon, and like bodies.

497,422. Henry, R. Apparatus for heating and tempering rails.

497,847. Whiteley, C. W., and Williams, D. D. Railway-chair key metal non-return grip.

498,016. Williams Ltd., H., and Williams, O. R. Means for securing permanent way rails to their sleepers.

498,034. Standard Telephones & Cables Limited, Griffiths, J. B., and Brown, A. Railway signalling systems.

498,143. Standard Telephones & Cables Limited, Griffiths, J. B., and Brown, A. Railway track control and indicating panels.

498,216. Hüper, A. Floors of transport vehicles.

498,513. Kochmann, W. Gas pressure brakes.

498,720. Ruhrhandel Gesellschaft. Mine trucks or corves.

498,893. Schweizerische Lokomotiv- und Maschinenfabrik. Steam turbine-driven locomotives.

498,996. Bije, A. J. M. A. R. van der D. De. Flue tubes for steam boilers.

499,013. Wonham, F. S. Wear-compensating means for railway and like rail joints.

499,047. Cowper, D. G. Erskine-. Water-gauge column standards for steam boilers and the like.

499,123. Pullman Car Co. Ltd. Railway sleeping cars.

499,340. Westinghouse Brake & Signal Co. Ltd. Railway traffic controlling apparatus.

499,364. Schweizerische Lokomotiv- und Maschinenfabrik. Bogie for railway vehicles.

499,381. Capo, E. Truck for the transportation of railway wagons on the road.

499,513. Accles & Pollock Limited, and Pardoe, F. Vehicle and other seats.

499,520. Davidson, A. S. Buffers for railway and like vehicles.

XUM

NOTES AND NEWS

Polish Railway Accident.—It is reported from Warsaw that five people were killed and 13 injured when a Rome–Warsaw express was derailed at Pruszkow, on June 7.

New Leeds Suburban Station. L.N.E.R.—On June 5, the Lord Mayor of Leeds opened a new station, called Penda's Way, situated between Cross Gates and Scholes, L.N.E.R. The unusual name commemorates Penda, the pagan King of Mercia, who marched this way to make war on the Northumbrian king.

C.N.R. Royal Engine for World's Fair.—At the request of the World's Fair Committee of the Association of American Railroads, the Canadian National Railways are sending the "6400" class locomotive at present hauling the royal train to be exhibited at the fair when its royal duties are concluded; it is expected to reach New York on June 15. It will be remembered that this streamlined locomotive is in royal blue livery and is decorated with the royal arms.

Canadian Senate and C.P.R.-C.N.R. Unification.—The Dominion Senate, on May 26, adopted the Railway Committee report amendment sponsored by Senator C. P. Beaubien, urging unification of the Canadian National and Canadian Pacific Railways. The vote was 25 to 21. The main motion, introduced by Senator Raoul Dandurand, Government leader, recommending further co-operative measures between the two railways, was thus automatically defeated when the amendment was adopted.

L.M.S.R. "City" Class Engines.—Twenty new streamlined locomotives which are being constructed at the L.M.S.R. Crewe works, and which will be put into traffic this summer, are to be named after cities on the L.M.S.R. system, namely:—

Birmingham, Bradford, Bristol, Carlisle, Chester, Coventry, Edinburgh, Glasgow, Lancaster, Leeds, Leicester, Lichfield, Liverpool, London, Manchester, Nottingham, St. Albans, Salford, Sheffield, and Stoke-on-Trent.

These locomotives will be generally similar to the "Coronation" class 4-6-2 engines.

New Inter-station Bus Services at Southampton.—Arrangements have been made by the Southern Railway and the Hants & Dorset Motor Services Limited for the running of inter-station motorbus services at Southampton. These services will operate between Southampton Central station and Southampton Docks (Continental booking office, No. 9 berth) in connection with the advertised boat sailings to and from Havre, St. Malo, and the Channel Islands, from now on until September 30. The fares for cross-Channel passengers using this new service will be as under: Adults, 9d. single journey; children (3 to 14 years), 6d. single journey (fares payable on the bus). Passengers' hand baggage will be conveyed free on the bus. This new bus service does not, of course, affect the present arrangement, whereby cross-Channel passengers from London travelling by the recognised boat trains are conveyed direct to the quayside in Southampton Docks.

Channel Tunnel Decision.—The French Channel Tunnel Committee has decided at a meeting in Paris to set up in France, Switzerland, Luxemburg, and Belgium, local bodies to press for the building of a Channel tunnel without delay. Committees will be set up all over France to raise funds for the scheme. The strategic value of the tunnel was cited as a reason for British support.

Tyne Kearney Tube Proposal.—In our April 28 issue we reported that it was proposed to construct a tube railway on the Kearney system between North and South Shields. The proposal was discussed on June 6 at a meeting of a special committee of the South Shields Town Council and representatives of the promoters. There has at present been no decision regarding a public inquiry by the Ministry of Transport.

Beira Railway Co. Ltd.—At a meeting of the holders of certificates issued by the British South Africa Company, representing shares in the Beira Railway Company, held in London on June 1, an extraordinary resolution was passed authorising the modifications of the provisions of the trust under which the British South Africa Company exercised the voting rights in respect of those shares. Accordingly, the trust, which would otherwise have been determined on July 1, 1942, will continue to subsist until an order is made or an effective resolution passed for the winding up of the railway company.

Augmented Service to Brittany.—The increasing popularity of the Brittany Coast as a holiday district has prompted the Southern Railway to introduce a special daylight service between Southampton and St. Malo. This will begin on July 22 and operate until September 2; it will be maintained by the ss. *Isle of Thanet*. Passengers will leave Waterloo by restaurant car express at 8.15 a.m., on Thursdays or Saturdays, and arrive at St. Malo at 7.15 p.m.; in the reverse direction they will leave St. Malo on Fridays, or Sundays, from July 23 to September 3, at 10.0 a.m., and arrive at Waterloo at 9.15 p.m. The night sailings in each direction will also be augmented during June, July, August, September, and early October.

Warsaw Station Destroyed by Fire.—The new central railway station in Warsaw, due to be completed this year, was destroyed by a fire which broke out early on June 6. Work had been in progress on the building for about four years, and it was already in use for regular traffic. One fireman was killed and four seriously injured, and some passengers were hurt. The damage to the station, which was planned to be one of the largest and best equipped in Europe, was estimated at three million zlotys.

Level Crossing Accident near Hamburg.—Twelve people are reported killed and many seriously injured when an omnibus carrying 35 passengers was hit by a train at a level crossing at Wulfsen, near Hamburg, on June 4. The omnibus driver is said not to have seen the train until too late, and his vehicle, brought to rest in the middle of the track, was struck by the engine and carried 20 yd.

South African "15 F" Class Locomotives.—In the illustrated description of these locomotives which appeared on pages 896-7 of our issue last week, mention was omitted of the fact that all the engines, 44 in number, are fitted with Fischer spherical and cylindrical roller bearings for the eccentric rod return crank-pins and the expansion links. Our attention was called to this only after the article had appeared.

A Visit to Germany.—At a meeting of the Railway Club held in the hall of the Royal Scottish Corporation on May 4, Mr. W. A. Willox (Vice-President) read a paper entitled "A Recent Visit to Germany." The paper touched on most of the phases of railway operation in Germany and Mr. Willox frequently drew attention to the high standard of efficiency on the railways. A series of excellent lantern slides of German railways was shown. These included illustrations of engineering works, permanent way repairs, and station working. A lengthy discussion followed and the meeting terminated with a hearty vote of thanks to Mr. Willox.

Chinese Railway Bonds.—The coupons which fell due on June 1, on the Chinese Shanghai-Nanking Railway bonds and the Canton-Kowloon issue were not met. The last coupon paid on the Shanghai-Nanking issue was that which fell due in June, 1936. This was met in December, 1937. In the case of the Canton-Kowloon issue, under the arrangement of August, 1936, interest was to be paid at the rate of 2½ per cent. per annum for the first 20 years and at 5 per cent. thereafter. Payments of 2½ per cent. were made on June 1, 1937, and on June 1, 1938.

Fatal Collision at Level Crossing on L.N.E.R.—A fatal collision occurred about noon on June 1, 1939, just north of Hilgay station, Norfolk, L.N.E.R., when, as briefly recorded in our issue of June 2, the 11.2 a.m. train from Hunstanton to Liverpool Street ran into a lorry at an occupation crossing. It was drawn by 4-4-0 locomotive No. 8783, a rebuilt G.E.R. engine, which, with the five following coaches, was derailed, and travelled some distance before stopping; the coaches struck some wagons standing in an adjoining siding and were considerably damaged, the

sides being torn open. The engine became separated from the train, but the buckeye couplers between the coaches held and no coaches were slewed round. Four lives were lost—one person dying subsequently to the accident—and six persons were injured. An inquest was held on 3 of those killed on June 3 and adjourned, and on the fourth person two days later, being further adjourned until July 3. The official inquiry is being conducted by Lt.-Colonel A. H. L. Mount, Chief Inspecting Officer of Railways.

Canadian Air Expansion.—Trans-Canada Air Lines has extended its air express service to Victoria, B.C. Victoria is connected with Vancouver by Canadian Airways Limited, and with other cities across the continent by Trans-Canada Air Lines and Prairie Airways. The Canadian National Express will collect, deliver, and perform other ground services necessary to the handling of air express. Trans-Canada Air Lines has placed an order for six new Lockheed "14" planes, similar to the nine big machines already in service, to replace the smaller "Electras" used on flights between Vancouver and Seattle; and Lethbridge, Calgary, and Edmonton. The new planes accommodate ten passengers and a crew of three, have a cargo capacity of 8,200 lb., and fuel capacity of 536 gal. With twin Pratt & Whitney 850-h.p. Hornet engines, they have a cruising speed of 209 m.p.h. and a maximum of 244 m.p.h.

"See as You Go" Travel on the L.M.S.R.—This summer, the L.M.S.R. will again attach to some trains in North Wales specially-built observation cars with large side and end windows giving passengers an excellent view of the scenery. The cars, which are 57 ft. long and seat 72 people, will cover 350 miles each weekday (Saturdays excepted) and 218 miles on Sundays on these routes: Llandudno to Blaenau Festiniog *via* the Conway Valley; Llandudno and Rhyl to Llanberis *via* Conway, Bangor and Caernarvon; Llandudno to Holyhead *via* Bangor and the Menai bridge. A conductor, who will point out places of interest *en route*, will ride in the car, for the use of a seat in which a small charge is made.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 22nd Week			Totals to Date		
	1939	1938	Inc. or Dec.	1939	1938	Inc. or Dec.
L.M.S.R. (6,830¼ mls.)	£	£	£	£	£	£
Passenger-train traffic...	609,000	680,000	– 71,000	9,697,000	9,754,000	– 57,000
Merchandise, &c. ...	434,000	433,000	+ 1,000	10,092,000	10,443,000	– 351,000
Coal and coke ...	175,000	238,000	– 63,000	6,126,000	5,968,000	+ 158,000
Goods-train traffic ...	609,000	671,000	– 62,000	16,218,000	16,411,000	– 193,000
Total receipts	1,218,000	1,351,000	– 133,000	25,915,000	26,165,000	– 250,000
L.N.E.R. (6,320 mls.)						
Passenger-train traffic...	405,000	398,000	+ 7,000	6,314,000	6,320,000	– 6,000
Merchandise, &c. ...	329,000	321,000	+ 8,000	6,989,000	7,382,000	– 393,000
Coal and coke ...	203,000	216,000	– 13,000	5,663,000	5,572,000	+ 91,000
Goods-train traffic ...	532,000	537,000	– 5,000	12,652,000	12,954,000	– 302,000
Total receipts	937,000	935,000	+ 2,000	18,966,000	19,274,000	– 308,000
G.W.R. (3,737¾ mls.)						
Passenger-train traffic...	246,000	273,000	– 27,000	4,089,000	4,076,000	+ 13,000
Merchandise, &c. ...	179,000	193,000	– 14,000	4,299,000	4,257,000	+ 42,000
Coal and coke ...	81,000	100,000	– 19,000	2,508,000	2,511,000	– 3,000
Goods-train traffic ...	260,000	293,000	– 33,000	6,807,000	6,768,000	+ 39,000
Total receipts	506,000	566,000	– 60,000	10,896,000	10,844,000	+ 52,000
S.R. (2,142 mls.)						
Passenger-train traffic...	374,000	406,000	– 32,000	6,370,000	6,304,000	+ 66,000
Merchandise, &c. ...	62,500	60,500	+ 2,000	1,307,500	1,342,000	– 34,500
Coal and coke ...	26,500	26,500	—	730,500	709,000	+ 21,500
Goods-train traffic ...	89,000	87,000	+ 2,000	2,038,000	2,051,000	– 13,000
Total receipts	463,000	493,000	– 30,000	8,408,000	8,355,000	+ 53,000
Liverpool Overhead ... (6½ mls.)	1,979	1,342	+ 637	30,339	29,328	+ 1,011
Mersey (4½ mls.) ...	4,914	4,264	+ 650	99,066	96,314	+ 2,752
*London Passenger Transport Board ...	633,600	582,700	+ 50,900	27,974,300	27,618,600	+ 355,700
IRELAND						
Belfast & C.D. pass. (80 mls.)	2,743	2,219	+ 524	41,837	40,904	+ 933
,, ,, goods	388	332	+ 56	9,396	9,503	– 107
,, ,, total	3,131	2,551	+ 580	51,233	50,407	+ 826
Great Northern pass (543 mls.)	12,600	10,150	+ 2,450	197,950	191,400	+ 6,550
,, ,, goods	10,800	9,400	+ 1,400	221,350	191,200	+ 30,150
,, ,, total	23,400	19,550	+ 3,850	419,300	382,600	+ 36,700
Great Southern pass. (2,076 mls.)	42,460	33,402	+ 9,058	670,926	665,151	+ 5,775
,, ,, goods	34,580	38,756	– 4,176	891,898	878,088	+ 13,810
,, ,, total	77,040	72,158	+ 4,882	1,562,824	1,543,239	+ 19,585

* 49th Week (before pooling) Whitsun Monday, 1939

British and Irish Railway Stocks and Shares

Stocks	Highest 1938	Lowest 1938	Prices June 7, 1939	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	65¼	25¾	36½	–¼
5% Con. Prefce....	118¾	74	90½	+1
5% Red.Pref.(1950)	111¾	90	95	—
4% Deb.	111	97½	100	—
4½% Deb.... ...	112 5/16	100½	102	—
4½% Deb.... ...	118½	104	104½	—
5% Deb.	131½	119	114½	—
2½% Deb.... ...	69¾	60	60	—
5% Rt. Charge ...	129	114	112½	—
5% Cons. Guar. ...	128½	103	108½	+1
L.M.S.R.				
Ord.	30½	11	16	—
4% Prefce. (1923)	70¼	23	44	–1
4% Prefce. ...	82¼	43¾	62	–½
5% Red.Pref.(1955)	103½	66	81½	—
4% Deb.	105 13/16	85	92½*	–2½
5% Red.Deb.(1952)	114¼	105	105½	—
4% Guar. ...	102¾	77½	86½	–1
L.N.E.R.				
5% Pref. Ord. ...	8 8/16	3½	5	–½
Def. Ord.	4 7/16	2 1/16	3⅛	–⅛
4% First Prefce.	68¼	21	36	–1
4% Second Prefce.	27¼	8	14	—
5% Red.Pref.(1955)	97	40¼	52½	—
4% First Guar. ...	97½	66¼	76½	–1
4% Second Guar.	91¼	52	67½	—
3% Deb.	79¼	60	67*	–2½
4% Deb.	104⅛	77	88*	–1½
5% Red.Deb.(1947)	110⅝	97	103½	—
4½% Sinking Fund Red. Deb.	108 11/16	101	98*	–2
SOUTHERN				
Pref. Ord. ...	87	47⅞	75	–1
Def. Ord. ...	21¾	9¼	18	–½
5% Pref.	115	83	99½	—
5% Red.Pref.(1964)	115½	98	99½	—
5% Guar. Prefce.	128½	106	110	—
5% Red.Guar.Pref. (1957)	116	109½	109½	—
4% Deb.	109¼	95	97½*	–1½
5% Deb.	129	117	114*	—
4% Red. Deb. 1962–67	107	101½	101½*	—
BELFAST & C.D.				
Ord.	4	3½	4	—
FORTH BRIDGE				
4% Deb.	102	99⅛	94½	—
4% Guar. ...	103¼	94½	92	—
G. NORTHERN (IRELAND)				
Ord.	5½	2½	3½	—
G. SOUTHERN (IRELAND)				
Ord.	25½	8½	8	—
Prefce.	35	13	12	—
Guar.	70¼	30 15/32	29	+5
Deb.	83	56	48¼	+4¼
L.P.T.B.				
4½% "A" ...	119⅝	107½	108½	–1
5% "A" ...	130	117	116½	—
4½% "T.F.A." ...	108	98	102½*	–1
5% "B" ...	122 13/16	105	112½	—
"C"	84	68	79½	–3
MERSEY				
Ord.	24¼	16½	24	+1
4% Perp. Deb. ...	102⅞	94¾	91	—
3% Perp. Deb ..	77	69	66½	—
3% Perp. Prefce.	66½	57	54½	+2

* ex dividend

XUM

RAILWAY AND OTHER REPORTS

Rohilkund & Kumaon Railway Co. Ltd.—At its meeting, on June 1, the board declared an interim dividend for the half-year ending March 31, 1939, of 4 per cent. together with a bonus of 4 per cent. or 8 per cent in all, on the ordinary stock. The dividend and bonus will be payable, less income tax, at 2s. 11d. in the £, on July 31.

Bengal & North Western Railway Co. Ltd.—The board, at its meeting on June 1, after placing as usual, £35,000 to sinking fund, declared an interim dividend for the half-year ending March 31, 1939, of 4 per cent., together with a bonus of 4 per cent., or 8 per cent. in all, on the ordinary stock. The dividend and bonus will be payable, less income tax at 3s. in the £, on July 31.

Wellington Grey & Bruce Railway Company.—Estimated earnings for the half-year ending June 30, 1939, applicable to meet interest on the 7 per cent. bonds, will admit of the payment of £3 19s. 3d. on each £100 bond. This payment will be applied as follows: £1 1s. 2d. in final discharge of Coupon No. 114 due July 1, 1927; and £2 18s. 1d. on account of Coupon No. 115 due January 1, 1928, and will be made on and after July 1 next. At the semi-annual ballot for May, 1939, 52 bonds of this series, amounting in all to £5,200 sterling, were drawn, and will be paid at par on July 1 next.

Southern San Paulo Railway Co. Ltd.—Credits to revenue account during 1938 amounted to £19,376, compared with £22,478 for the preceding year, a decrease which is mainly accounted for by the lower sterling value of Brazilian currency. Revenue charges, including a full year's debenture interest, amounted to £28,403, against £28,499, making a loss for the year of £9,027, compared with £6,021, and the debit balance forward is raised to £52,774. The debenture stockholders' committee has agreed to an extension of the moratorium to cover 1939. It was not possible to make any payment on account of the debenture interest, which fell due on July 1, 1938, and January 1, 1939, owing to difficulties in remitting funds from Brazil. Half-yearly interest payments on January 1 and July 1, 1937, and on January 1, 1938, were 1½ per cent.

Southdown Motor Services Limited.—For the year ended March 31, 1939, this company, which is jointly controlled by the Southern Railway Company and Tilling & British Automobile Traction Limited, secured a gross revenue of £1,002,983, compared with £981,908 in the previous year. After deducting £586,383 (£529,739) for operating and maintenance expenses, £165,527 (£164,922) for Road Act duties, rates, and taxes, £135,807 (£140,559) for depreciation, and other items chargeable against revenue, there remains a profit of £99,863 (£85,543), to which must be added £19,027 brought forward, making a total of £118,890, compared with £104,027 for the previous year. Out of this amount it is proposed to place £20,000 (against £10,000) to reserve, to pay, as in the previous year, a dividend of 10 per cent., requiring £75,000, and to carry forward £23,890.

Northern Ireland Road Transport Board.—The Board announces with regret that, in view of the present uncertainty of the position, it has deferred payment of interest on the "A" stock, due on July 1. Interest on the "A1" stock was last paid in June, 1938, and on "A2" stock in December, 1937. Last July they were merged and became "A" stock, on which no interest has yet been paid.

Eastern Counties Omnibus Co. Ltd.—The accounts of this company, which is controlled jointly by the L.N.E.R. and L.M.S.R. companies and by Tilling & British Automobile Traction Limited, for the year ended March 31, 1939, show a profit of £82,139 (against £71,454) to which must be added £30,187 brought forward, making a total of £112,326, against £100,667. The preference dividend again takes £10,000, and the directors again recommend a dividend on the ordinary shares of 8 per cent. for the year, which will absorb £60,480. They also propose to carry £10,000 (against nil) to general reserve fund, leaving £31,846 to be carried forward. Workshop extensions are in progress at Cambridge and Ipswich. The omnibus station and garage at Great Yarmouth has been opened.

British Electric Traction Co. Ltd.—The full report for the year ended March 31, 1939, shows that revenue amounted to £728,513. After deducting general expenses, income tax, &c., of £166,636, and charging £79,479 debenture stock interest, there is a profit of £482,398, an increase of £35,926 compared with the previous year. The directors recommend payment of the following dividends for the year ended March 31, 1939: 6 per cent. on the participating preference stock £42,765); 8 per cent. on the preferred ordinary stock (£106,101); and 5 per cent. on the deferred ordinary stock (£35,943). Subject to the proposed dividend on the deferred ordinary stock being approved, the preference stockholders are entitled to receive a further dividend of 2 per cent. (£14,255), making 8 per cent. for the year. The directors further recommend that £71,887, equal to 10 per cent. on the deferred ordinary stock, be capitalised and distributed to the deferred ordinary stockholders in fully paid deferred ordinary shares of £1 each, such shares to be converted subsequently into deferred ordinary stock. After these further appropriations, there is a balance of £211,447 to be added to undivided profits account. The share of the year's profit available for distribution among the deferred ordinary stockholders amounts to £319,277. The issued capital has been increased during the year by the distribution of 65,352 deferred ordinary shares of £1 each to the deferred ordinary stockholders, which shares have since been converted into stock. A sum of £10,000 has been set aside for the staff benevolent fund out of profits from sales of investments.

Chloride Electrical Storage Co. Ltd.—Profits for the year ended March 31 last amounted to £324,995, compared with £435,724 for the year 1937-38. The dividend for the year is maintained at 10 per cent., less tax, with a final of 5 per cent., but the bonus addition is halved at 5 per cent., less tax.

Channel Tunnel Co. Ltd.—The report for 1938 states that the Channel Tunnel project has been revived by the French deputy for the department of the Vosges, M. Marcel Boucher, who, on December 20, 1938, gave notice of a motion requesting the French Government to approach the British Government with a view to resuming negotiations for the construction of the tunnel. It is uncertain whether a vote on the motion will be taken before the summer holiday recess. Receipts in 1938 from interest and transfer fees amounted to £799, and expenditure to £476, leaving £323 balance to general balance sheet.

Kitchen & Wade Limited.—A net profit of £95,508 is announced for the year ended March 31, 1939, compared with £71,256 for 1937-38. A sum of £32,292, against £21,655, is set aside for income tax and N.D.C.; £5,375, against £5,000 is utilised in writing down goodwill to a nominal figure of £1; and £10,000, against nil, is transferred to general reserve. It is proposed again to pay a final dividend of 12½ per cent., making 25 per cent. for the year, together with a bonus of 30 per cent., which compares with a bonus of 20 per cent. for the previous year, so that the total distribution for 1938-39 is 55 per cent., against 45 per cent. for 1937-38. The amount carried forward is £4,457, against £6,460 brought in.

Callender's Cable & Construction Co. Ltd.—For the year 1938 net profits were £375,112, compared with £547,987 for the year 1937. This reduction was largely caused by a hold-up of business due to the critical foreign situation, which had the effect of slackening orders for the Erith works, particularly in the case of super tension cables. Orders for rubber cables were maintained, and general export trade was not adversely affected. The directors have set aside £75,000, against £100,000, for taxes, and propose to maintain the dividend on the ordinary shares at 15 per cent., including the interim distribution of 5 per cent., but they do not recommend the payment of any bonus, against 5 per cent. a year ago. A transfer of £250,000, against nil, is made to reserve, and the amount carried forward is £390,548, compared with £565,023 brought in.

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APPLICATIONS from qualified candidates are invited for the following post:—

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required for the Government Railways of Palestine for two tours of 18-24 months with prospect of permanency. Salary £P550 a year, plus expatriation allowance of £P50 a year and cost of living allowance at present £P48 per annum. (£P1 equals £1.) Free passages and if married for wife and children and leave on full salary. Candidates, age 25-30, preferably single, must be Corporate Members of the Institution of Civil Engineers or hold an Engineering degree recognised as granting exemption from sections A and B of the A.M.I.C.E. examination. They must have had experience on a Home or Colonial Railway with particular reference to survey, track maintenance and Railway Civil Engineering practice.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/8416.

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CONTRACTS AND TENDERS

H. W. Ward & Co. Ltd. has received an order from the Rohilkund & Kumaon Railway Administration to the inspection of Messrs. Rendel, Palmer & Tritton, for one electrically-driven combination type lathe.

The Gaekwar's Baroda State Railway Administration has placed the following orders for equipment to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton :—

Bantling & Tresilian Limited: 1,224 steel boiler and flue tubes.

Thos. Firth & John Brown Limited: 36 axles for locomotives, carriages, and wagons.

Linley & Co. Ltd.: 18 copper firebox plates.

J. Baker & Bessemer Limited: 108 steel tyres for locomotives, carriages, and wagons.

G.W.R. Contracts

The directors of the Great Western Railway have authorised the placing of the following contracts :—

Scammell Lorries Limited: Supply of 24 8-ton articulated trailer chassis and two 10-ton articulated trailer chassis.

J. I. Thornycroft & Co. Ltd.: Supply of seven Thornycroft tractors.

Garlicks, Burrell & Edwards Limited: Supply of six 8-ton Bedford-Scammell tractors.

McLennan Motors Limited: Supply of one Austin "Iver" saloon.

The Vaughan Crane Co. Ltd.: Supply and erection of one 1-ton runway for new goods warehouse at Slough.

The Wharton Crane & Hoist Co. Ltd.: Supply and erection of one 3-ton hand electric single girder overhead travelling crane for "V" (boiler) shop, Locomotive Works, Swindon.

Kitchen & Wade Limited: Supply of a radial drilling, tapping, and studding machine for "W" (machine) shop, Locomotive Works, Swindon.

At the company's docks—

Penarth Pontoon, Slipway & Ship Repairing Co. Ltd.: Overhaul of the following vessels: s.h.b. *Viscount Churchill*, ss. *St. Helier*, tug *The Earl*.

Port Talbot Dry Dock Co. Ltd.: Overhaul of the launch *Aberavon*.

The Indian Stores Department is calling for tenders (Tender No. N.384) for the supply and delivery of quantities of steel axles and tyres. Tenders should reach the Indian Stores Department, Simla, by June 21. A copy of the schedule of requirements and conditions of tender, together with drawings, may be borrowed from the Department of Overseas Trade, London, S.W.1.

The South African Railways and Harbours Administration is calling for tenders (Tender No. 2201) for the supply and delivery of quantities of steel tyres and axles. Tenders endorsed "Tender No. 2201, Steel tyres and axles" should reach the Secretary to the Tender Board, South African Railways and Harbours Headquarter Offices, Johannesburg, by August 8. A copy of the schedule of requirements and general conditions of tender, together with drawings, may be borrowed from the Department of Overseas Trade, London, S.W.1.

Tenders are invited by the Imperial Iranian Government for the supply of equipment for the laying of railway tracks. Particulars and specifications may be obtained from the Commercial Attache to the Imperial Iranian Legation, Ling House, 10-13, South Street, London, E.C.2.

Tenders are invited by the Egyptian State Railways Administration, receivable at the General Management, Cairo station, by June 26, for the supply of one chain-testing machine. Particulars are obtainable from the Chief Inspecting Engineer, Egyptian Government, 41, Tothill Street, London, S.W.1.

North London Railway Extensions

The first section of the new North London extensions, from the present Highgate tube station, which will be renamed Archway (Highgate) on June 11, to East Finchley, will be opened on July 3. This will enable Northern Line trains to run over the present L.N.E.R. branches to High Barnet and Edgware; from the latter station trains will ultimately be projected over a new line to Bushey Heath.

A junction will be constructed between the Northern City tube line from Moorgate and the L.N.E.R. station at Finsbury Park, where a new platform will be built. Northern City trains will then continue over the L.N.E.R. line to Alexandra Palace and to High Barnet. The present tube station at Finsbury Park will be retained to serve as a terminus for a peak-hour service from Moorgate.

Highgate (L.N.E.R.) station is being entirely reconstructed with three entrance halls, and a new ticket hall, connected by escalator with "The Woodman" Corner. Another flight of escalators will run down to new Underground platforms served by Northern Line trains to the West End and to the City, *via* Euston. The Northern Line tunnel will rise to the surface at East Finchley, where a handsome new station is being built. By the arrangements at this point, passengers will be able to choose, by walking across a platform, between high-level and deep-level trains to the West End and City. Finchley (Church End) station—to be called Finchley Central—will be brought up to date, and the intermediate stations between Highgate and Finsbury Park, Highgate and Alexandra Palace, and Finchley and High Barnet will be improved. The old G.N.R. station at Edgware will be abandoned and its place will be taken by the London Transport's Edgware station, which is undergoing enlargement in order to be able to perform its function as a great railway focal point for North London.

L.N.E.R. CARRIAGE WORKS AT DUKINFIELD.—The L.N.E.R. announces that with a view to effecting essential economies it has been decided to adopt a further scheme for the centralisation of the company's workshops by reorganising the arrangements for the repair of carriages at present carried out at Doncaster, York, and Dukinfield. The carriage repair work at present undertaken at Dukinfield will be distributed between the Doncaster and York Carriage Shops, whilst the repair of certain special types of carriages, at present carried out at the two latter places, will be centralised at Doncaster. The forge and smithy will be retained at Dukinfield, and certain of the Dukinfield shops will be utilised for the repair of wagons. The transfer of carriage repair work from Dukinfield will inevitably affect the employment of a number of the workshop staff, but additional staff will be required at York to handle the work transferred to that place, and, as far as possible, an option will be given to the staff at Dukinfield to move to York. The scheme will have the effect of increasing the efficiency of the company's workshop organisation.

XUM

Railway Share Market

Since the beginning of the new Stock Exchange account on Monday the stock and share markets have shown an easier trend owing to the absence of improvement in the volume of business. A certain amount of profit-taking was in evidence following the recent strong upward movement of values, but the undertone of markets was described as steady. Sentiment was, however, rather more under the influence of international political uncertainties and was unresponsive to the lower unemployment figures and the steel production output announced for the past month, which were up to best expectations. The traffics of the main-line railways for the past week were regarded as satisfactory bearing in mind that comparison is with the pre-Whitsun week a year ago.

Home railway securities were less active in accordance with the surrounding market trend, and movements in prices were to slightly lower levels. There is a widespread tendency to await the half-yearly statements, and it is assumed in many quarters that granted it has been possible to effect further economies, the net figures may create quite an encouraging impression. It is realised, however, that expenses must be expected to rise in the second half of the year if the anticipated further improvement in traffics is borne out. Great Western ordinary stock, market views in connection with which were mentioned last week, attracted attention on any easing in price, and following a moderate reaction subsequently showed a small rally to 36¾, while the 5 per cent. preference was 90½ and the 4 per cent. debentures were quoted at par. Hopes of a possible 3 per cent. dividend for the current year are tending to increase speculative interest in the ordinary stock. L.M.S.R. ordinary rallied to 16⅛ after an earlier decline, while the 4 per cent. preference was 61½, the 4 per cent. 1923 preference 43½ and the 4 per cent. guaranteed, which gives quite an attractive yield, was around 87. L.N.E.R. first preference had a steadier appearance later at 35, as did the second preference at 13½, while the first guaranteed was 76½ and the second guaranteed 67½. Yields on the two latter stocks would seem unduly large; last year it may be recalled the dividend requirements of the second guaranteed stock were only just earned, but this year there seem good prospects of the dividend being covered by a satisfactory margin. Market men are, in fact, still hopeful that the first preference shares may receive a small payment in respect of the current year. Southern deferred receded to 17⅞ at one time, but later rallied to 18⅛, while the preferred was lower at 74¾, although it is being pointed out in the market that the yield appears to be unduly large. London Transport issues were relatively steady, and the "C" stock was quoted around 80.

San Paulo and Leopoldina securities were firmer in sympathy with Brazilian Government bonds, but subsequently they became easier with the latter. B.A. Great Southern, Central Argentine and other stocks of the chief Argentine railways subsequently became moderately reactionary owing to the absence of demand. American railway issues rallied following the better trend of Wall Street markets, and Canadian Pacific were 5⅛, while the preference stock was more active around 29¼. French railway bonds were in some demand.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1938-39	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1938	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1938	Prices: Lowest 1938	Prices: June 7, 1939	Prices: Yield (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	4 6.39	12,940	— 1,580	22	293,730	378,550	— 84,820	Ord. Stk.	14	7¼	7	Nil
	Argentine North Eastern ..	753	3.6.39	11,228	— 1,204	49	477,789	449,503	+ 28,286	,,	6½	2	3½	Nil
	Argentine Transandine ..	—	—	—	—	—	—	—	—	A. Deb.	82	75	70½	51/16
	Bolivar	174	May 1939	4,950	+ 1,500	21	20,300	19,050	+ 1,250	6 p.c. Deb.	8	7	7	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	10	4	6	8/16
	Buenos Ayres & Pacific ..	2,801	3.6.39	88,151	+ 6,451	49	4,337,969	4,324,448	+ 13,521	Ord. Stk.	6½	3¼	4½	Nil
	Buenos Ayres Central ..	190	20.5.39	$110,700	+ $4,800	47	$4,686,500	$5,354,100	— $667,600	Mt. Deb.	15½	8	14	Nil
	Buenos Ayres Gt. Southern	5,082	3.6.39	125,620	— 7,010	49	7,013,213	7,283,062	— 269,849	Ord. Stk.	17⅝	8½	9½	Nil
	Buenos Ayres Western ..	1,930	3.6.39	47,146	+ 7,505	49	2,275,868	2,210,360	+ 65,508	,,	12¾	5	8	Nil
	Central Argentine	3,700	3.6.39	138,508	+ 34,094	49	5,822,310	5,835,807	— 13,497	,,	13¼	5¾	8½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	6	2½	3½	Nil
	Cent. Uruguay of M. Video	972	27.5.39	19,117	— 3,057	48	887,241	883,348	+ 3,893	Ord. Stk.	3	1¼	1	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	3¾	¾	2½	Nil
	Costa Rica	188	April 1939	20,534	— 7,054	44	221,214	260,926	— 39,712	Stk.	28	22½	23	8/16
	Dorada	70	April 1939	11,900	— 2,200	17	52,300	60,900	— 8,600	1 Mt. Db.	105¼	104	103½	5¾
	Entre Rios	810	3.6.39	18,046	+ 2,134	49	763,712	698,899	+ 64,813	Ord. Stk.	7¼	3½	5	Nil
	Great Western of Brazil ..	1,092	3.6.39	5,900	+ 500	22	212,000	163,600	+ 48,400	Ord. Sh.	3/-	1/-	¼	Nil
	International of Cl. Amer..	794	April 1939	$534,509	+ $10,645	17	$2,284,653	$2,056,785	+ $227,868	—	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	6d.	6d.	½	Nil
	La Guaira & Caracas ..	22¾	May 1939	6 940	+ 1,035	22	28 640	25,635	+ 3,005	Stk.	8	6½	7½	Nil
	Leopoldina	1,918	3.6.39	15,557	— 1,504	22	416,454	405,277	+ 11,177	Ord. Stk.	4	1	2	Nil
	Mexican	483	31.5.39	$544,500	+ $71,800	21	$6,962,400	$6,694,000	+ $268,400	,,	¼	1/16	1/8	Nil
	Midland of Uruguay ..	319	April 1939	6,786	— 3,078	44	89.596	96.167	— 6,571	,,	⅞	½	½	Nil
	Nitrate	386	31.5.39	2,609	— 1,392	21	51,279	73.026	— 21,747	Ord. Sh.	52/9	19/16	15/8	711/16
	Paraguay Central	274	27.5.39	$3,374,000	— $1,655,000	48	$147,762.000	$153.553,000	—$5,791,000	Pr. Li. Stk.	60	55½	47½	125/8
	Peruvian Corporation ..	1,059	May 1939	55,431	— 13,107	48	726.081	879.402	— 153 321	Pref.	5¾	1¾	2	Nil
	Salvador	100	27.5.39	¢15.150	+ ¢2.980	48	¢985.939	¢942,495	+ ¢43,444	Pr. Li. Db.	23	20	19½	Nil
	San Paulo	153½	28 5.39	37,625	+ 4,075	21	643,221	675,712	— 32,491	Ord. Stk.	64	28	27½	7¼
	Taltal	160	April 1939	1,695	— 1,335	44	29,225	34,985	— 5,760	Ord. Sh.	1⅝16	½	½	10
	United of Havana	1,353	3 6.39	17,778	+ 1,017	49	1,149,030	1,202,634	— 53,604	Ord. Stk.	3⅝	½	1	Nil
	Uruguay Northern	73	April 1939	715	— 291	44	9,813	9,484	+ 329	Deb. Stk.	2	1	1½	Nil
Canada	Canadian National	23,762	31.5.39	1,105,828	+ 233,174	21	14,498,401	13,811,463	+ 686,938	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	72	60	68½§	51/16
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104	90	97½	4⅛
	Canadian Pacific	17,171	31.5.39	789,000	+ 103,000	21	10,290,800	10,228,600	+ 62,200	Ord. Stk.	8⅞16	4¼	5½	Nil
India†	Assam Bengal	1,329	20.5.39	36,570	— 1,335	7	181,350	184,391	— 3,041	Ord. Stk.	8½	70	72½	4⅛
	Barsi Light	202	20 5.39	3,172	— 660	7	16,268	21,495	— 5,227	Ord. Sh.	60½	54¼	50½	515/16
	Bengal & North Western ..	2,108	20.5.39	83,213	— 8,634	7	406,389	459,713	— 53.324	Ord. Stk.	311	278	262	7⅞
	Bengal Dooars & Extension	161	20.5.39	2.451	— 837	7	13.315	17,162	— 3,847	,,	89	83	86	79/16
	Bengal-Nagpur	3,272	20.5.39	225,450	+ 19,273	7	1,132,200	1,047 136	+ 85,064	,,	95½	90	90½§	47/16
	Bombay, Baroda & Cl. India	3,085	31.5.39	288,675	— 4.200	9	1,614.000	1,669,275	— 55,275	,,	112⅞16	95	102½	5⅞
	Madras & Southern Mahratta	2,967	20 5.39	183.150	+ 11,954	7	898,050	840 898	+ 57,152	,,	108	97	102½	75/16
	Rohilkund & Kumaon ..	571	20.5.39	15.734	— 3,363	7	80,410	96,019	— 15,609	,,	308	285	268	513/16
	South Indian	2,531¾	10 5.39	117.245	— 1,736	6	461,061	465,786	— 4,725	,,	104	101	97⅛§	5⅛
Various	Beira-Umtali	204	Mar., 1939	76,658	— 8,175	26	476.574	528.588	— 52,014	—	—	—	—	—
	Egyptian Delta	623	20.5.39	4.719	— 110	7	25,103	25,901	— 798	Prf. Sh.	⅞	5/6	½	Nil
	Kenya & Uganda	1,625	April 1939	231,378	— 36,217	17	1,014,313	1,091,480	— 77,167	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	49	41	41	8⅝16
	Midland of W. Australia ..	277	April 1939	12,911	— 3,674	44	151,664	147.589	+ 4,075	Inc. Deb.	93¾	89	90½§	47/16
	Nigerian	1,900	22.4.39	40,962	+ 6,253	4	103,104	109,004	— 5,900	—	—	—	—	—
	Rhodesia	2,442¾	Mar., 1939	335.532	— 74,962	26	2,173,950	2,512,028	— 338,078	—	—	—	—	—
	South Africa..	13,284	13.5.39	631,974	+ 31,583	7	3,950,762	3,699 957	+ 250 805	—	—	—	—	—
	Victoria	4,774	Mar., 1939	851.479	— 57,608	39	7,089,208	7,350,144	— 280,936	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being over estimated. The statements are based on the current rates of exchange and not on the par value